**Department of Energy**
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

0053394

00-OSS-401

JUL 06 2000

Ms. L. E. Ruud, Permit Specialist
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West 4th Avenue
Kennewick, Washington 99336

RECEIVED
JUL 17 2000
EDMC

Dear Ms. Ruud:

QUARTERLY NOTIFICATION OF CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) PERMIT, DANGEROUS WASTE PORTION (DW PORTION) (QUARTER ENDING JUNE 30, 2000, CONDITION I.C.3.)

In accordance with Condition I.C.3. of the Hanford Facility RCRA Permit, enclosed for your notification are the Class 1 modifications to the Hanford Facility RCRA Permit, DW Portion. Modifications this quarter included updating information in Part III (enclosure). The Part III Class 1 modifications pertain to the Liquid Effluent Retention Facility and Effluent Treatment Facility, 305-B Storage Facility, and the 325 Hazardous Waste Treatment Units. The Class 1 modifications are being made to ensure that all activities conducted are in compliance with the RCRA Permit, DW Portion.

Should you have any questions regarding this information, please contact Ellen M. Mattlin, U.S. Department of Energy, Richland Operations Office, on (509) 376-2385;

JUL 06 2000



Richard H. Engelmann, Fluor Hanford, on (509) 376-7485; or Alice K. Ikenberry, Pacific Northwest National Laboratory, on (509) 373-5638.

Steven H. Wisness, Director
Office of Site Services
DOE Richland Operations Office

Richard H. Gurske, Project Manager
Environmental Services
Fluor Project Hanford

Roby D. Enge, Director
Environment, Safety, and Health
Pacific Northwest National Laboratory

OSS:EMM

Enclosure:
Quarterly Notification of Class 1
Modifications to the Hanford Facility
RCRA Permit, DW Portion

cc w/encl:
Administrative Record, H6-08
H. F. Operating Record, G1-27
Ecology NWP Kennewick Library
R. J. Landon, BHI
W. Burke, CTUIR
M. A. Wilson, Ecology
S. A. Thompson, FHI
Environmental Portal, LMSI
P. Sobotta, NPT
A. K. Ikenberry, PNNL
R. Jim, YN

cc w/o encl:
L. J. Cusack, Ecology
S. Moore, Ecology
J. J. Wallace, Ecology
A. B. Stone, Ecology
D. R. Sherwood, EPA
E. S. Aromi, FHI
R. H. Gurske, FHI
R. D. Enge, PNNL

# Hanford Facility RCRA Permit Modification Notification Forms

## Part III, Chapter 2 and Attachment 18
## 305-B Storage Facility



## Index

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: **305-B Storage Facility** | Permit Part & Chapter: **Part III, Chapter 2 and Attachment 18** |
|---|---|

Description of Modification:

Chapter 7

Remove Chapter 7 and replace with the attached Chapter 7.

| Modification Class: [1 2 3] | Class 1 | Class[1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions:

1. Administrative and informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| Anie K. Ikenberry 6/27/00 | R.F. Christensen 6/29/00 | | |
| A.K. Ikenberry Date | R.F. Christensen Date for | J. J. Wallace Date | L.E. Ruud Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification

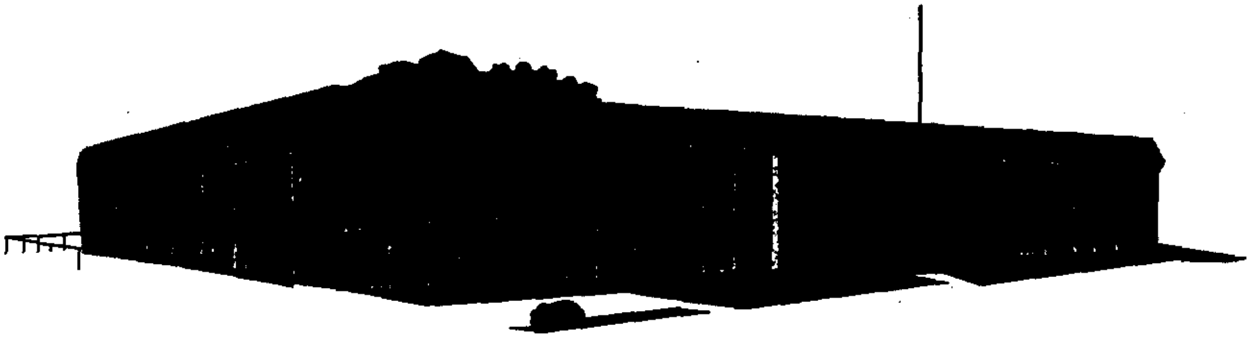
# Part III, Chapter 2 and Attachment 18
# 305-B Storage Facility

Replacement Chapter

## Index

Chapter 7

# BUILDING EMERGENCY PROCEDURE
## 305-B Storage Unit



Environmental Management Services — Date: 5/9/00

Building Emergency Director — Date: 5/19/00

Facilities Operations Manager — Date: 6/1/00

Approved:

Emergency Preparedness Office — Date: 6/13/00

**<u>June 2001</u>**

Scheduled Revision Date

# 7.0 Contents

# 7.0 Building Emergency Procedure 305-B Storage Unit

## 7.1 General Information

The information contained in this chapter is the unit contingency plan, as required under WAC 173-303-806(4)(a)(vii). This chapter is also the Building Emergency Procedure (BEP) as required under the DOE-RL Hanford Emergency Management Plan and PNNL Manual, PNNL-MA-110. It supersedes all previous contingency plans and building emergency procedures (BEPs). It is to be maintained in the locations shown in Section 7.13 of this procedure.

A BEP is required under the DOE-RL Hanford Emergency Management Plan for each building on the Hanford Site. This Contingency Plan has been designed to meet the requirements for a BEP as well as the Ecology requirements for a contingency plan for the 305-B Storage Unit. The Hanford Emergency Management Plan details the membership of the DOE-RL Site Management Team (SMT) mentioned in Section 7.3 and following sections, and the procedure for notifying and mobilizing the team.

PNNL shall review and immediately amend, if necessary, this procedure whenever:

- Applicable regulations or the facility permit are revised;
- The procedure fails in an emergency;
- The facility changes (in its design, construction, operation, maintenance, or other circumstances) in a way that materially increases the potential for fires, explosions, or releases of dangerous waste or dangerous waste constituents, or in any way that changes the response necessary in an emergency;
- The list of emergency equipment changes.

Amendments to the procedure, if necessary following review, will be made in accordance with Chapter 1, Section 1.5 of the 305-B Storage Unit Part B Permit Application.

### 7.1.1 Facility Name

305-B Storage Unit
Alaska St., 300 Area
Richland, WA 99352

### 7.1.2 Facility Location

305-B Storage Unit is located in the Northwest portion of the 300 Area of the Hanford Site on Alaska Street.

### 7.1.3 Owner/Operator

The 305-B Storage Unit is owned by the United States Department of Energy (DOE) and is co-operated by Battelle for the Pacific Northwest National Laboratory (PNNL).

### 7.1.4 Facility Description

The 305-B Storage Unit is a dangerous and radioactive mixed waste storage facility located in the 300 Area of the Hanford Site. The unit is owned and operated by DOE-RL and co-operated by Battelle for PNNL. It is used for the collection, consolidation, and packaging of containerized dangerous and radioactive mixed waste. Typically, 305-B Storage Unit handles various types of small volume wastes from research laboratory activities.

### 7.1.5 Hanford Site Emergency Sirens/Alarms

| Signal | Meaning | Response |
|---|---|---|
| Gong (2 gongs/sec) | Fire | Evacuate building. Move upwind. Keep clear of emergency vehicles. |
| Siren (steady blast) | Area Evacuation | Proceed promptly to north parking lot accountability area. Follow instructions. |
| Wavering Siren | Take Cover | Close all exterior doors, turn off all intake ventilation and notify EMSD of your whereabouts. Requests call back for status and monitor portable radios. |
| Howler (Aa-oo-gah) | Criticality | Follow "take cover" instructions above. (No criticality will take place in 305-B Storage Unit since fissile materials are not accepted for storage.) |
| To hear these signals and a description of actions to take, call 373-2345. | | |

The following is presented to define specific emergency actions for personnel assigned to 305-B Storage Unit for different types of emergencies that could be encountered during normal operations.

Area-wide Evacuation. (Signal: Steady siren of 3-5 minutes' duration) In the event of an area-wide evacuation of the 300 Area, 305-B Storage Unit personnel will shut down equipment, secure wastes (especially RMW), and secure classified documents (or carry them with them), if time permits. They will then report to the north parking lot accountability area. Notify the BED of any ongoing processes or any compromises to security. The zone warden will account for all facility personnel.

Take Cover. (Signal: Wavering siren) In the event a take cover alarm is sounded, 305-B Storage Unit personnel will stay inside the 305-B Storage Unit, close all exterior doors, and turn off all intake ventilation. They will secure all wastes and classified documents. Personnel will then contact Environmental Management Services with their whereabouts and request a call back for status.

### 7.1.6 Building Specific Emergency Alarms

The 305-B Storage Unit has an alarm system (2 gongs/sec) that is monitored by the Hanford Fire Department (HFD). A manual fire alarm pull box is located near each exit door.

### 7.1.7 Communication Equipment

Unit operations personnel may also use telephones, or the building PA system. Further description of communication equipment is located in Chapter 6, Sections 6.3.1.1 and 6.3.1.2 of the 305-B Storage Unit Part B Permit Application.

## 7.2 Purpose of the Building Emergency Procedure

This procedure provides for the safety of employees, other contractor personnel, visitors, and members of the general public in the event of an emergency. It also is designed to minimize hazards resulting from fires, explosions, or any other unplanned sudden or non-sudden release of dangerous waste or dangerous waste constituents to air, soil, or water. The provisions of the procedure will be carried out immediately whenever there is a fire, explosion, or release of dangerous waste or dangerous waste constituents, which could threaten human health or the environment.

## 7.3 Building Emergency Response Organization

The 305-B Storage Unit BERO is an emergency response organization with clearly defined responsibilities. The BERO consists of pre-designated and trained individuals who have been assigned emergency response activities associated with 305-B Storage Unit.

**Note:** DOE-RL and other (non-PNNL) contractor personnel are trained to notify Hanford Emergency number (911 from onsite telephones) operated by the Hanford Patrol who then notifies the PNNL Single Point-of-Contact.

### 7.3.1 Building Emergency Directors and Alternates

The Building Emergency Director (BED) has the responsibility for the welfare and safety of the building personnel and for directing efforts to control, evaluate, and terminate the event if the building is the site of an event. The BED performs the duties of the Emergency Coordinator as prescribed under WAC 173-303-360 and has the authority to commit the resources needed to carry out the BEP.

The BED manages facility operations and personnel and is responsible for ensuring implementation of appropriate emergency procedures and their follow-up 24 hours a day. Activities include:

- Direct configuration control over facility systems and components.
- Implement Emergency Response and Follow-up.
- Responsible for the duties of the Facility Operations Specialist per PNNL MA-110 or delegate to someone to act as Facility Operations Specialist if necessary.
- Activates the BERO and allocates personnel to conduct facility-specific emergency response actions (within the affected facility boundary).
- Categorization and notification of the incident to the site contractor, Single Point-of-Contact and/or the Occurrence Notification Center (ONC).
- Directing implementation of initial preplanned area/site protective actions.
- Coordinate emergency response measures.
- Verifies the appropriate alarm is sounded when necessary.
- Acts as a member of the ICP and provide information and assistance to the responding agencies as requested to mitigate the event.
- Arranges care for any injured persons.
- Maintenance of emergency equipment.
- Timely implementation of contingency plan in the event of an emergency.
- Be thoroughly familiar with:
    - 305-B Storage Unit Emergency Procedure
    - All operations and activities
    - Location and characteristics of waste handled
    - Location of all records
    - Physical layout of the building and area of responsibility

### 7.3.2 Other Members of the Building Emergency Response Organization (BERO)

#### 7.3.2.1 Zone Wardens

Zone Wardens provide information to the BED via the Staging Area Supervisor to ensure that no one is unaccounted for, and assists as required in additional duties as determined by the BED. They determine if all personnel have left their assigned area by performing a thorough room-by-room search, if safe to do so (refer to Note below), including unoccupied spaces such as stairwells, corridors, closets, and other common areas. They determine if aid and/or rescue are required and aid those who may need help in evacuating the building. Ensure that disabled persons receive whatever assistance may be required for a safe and orderly evacuation. Report the occupancy status of the assigned zone(s) to the Staging Area Supervisor and note areas that could not be checked.

**Note:** The function of the zone warden is to verify (when possible), that assigned zones have been evacuated, as a means of assisting other emergency responders, and verifying locations of building personnel. The function of zone wardens does not include search and rescue; they are not obligated to enter any area they feel presents a hazard to them. Once the evacuation alarm is sounded, zone wardens should not enter any location in the facility where there are indications that a hazard may exist. The indications include such things as: visible smoke, fire, unusual odors, local alarms, spilled chemicals, indications on the fire alarm supervisory panel, incapacitated personnel, etc. If a zone warden is not in the facility when the evacuation alarm sounds; is a significant distance from their assigned zones; or has been isolated from their zone, they should report to the Staging Area Supervisor at the Staging Area or Incident Command Post for instructions.

#### 7.3.2.2 Staging Area Supervisor

The Staging Area Supervisor (SAS) will direct all activities at the Building Staging Area and is responsible for notifying the BED if all personnel are accounted for, or if help is needed to locate or account for missing personnel. The SAS will also support the BED, if requested. In the event of an extended building evacuation during inclement weather, the BED will identify an Alternate Staging Area.

- The SAS collects the occupancy/accountability status from the Zone Wardens at the Staging Area.
- Report status to the BED at the Staging Area or Incident Command Post.

#### 7.3.2.3 Recorder

Records, in a time-line format, event related notifications and activities associated with the direction administered and information received by the ICP.

#### 7.3.2.4 Environmental, Safety & Health

Provides guidance for establishing safety requirements for mitigation and recovery actions, which include:

- Coordinating any support needed from other disciplines of the PNNL ES&H Directorate (i.e., Environmental Compliance Representatives, Radiological Control, Industrial Hygiene and Field Service Representative).
- Provide telephone notification of incident to DOE-RL contact personnel, Sections 12.4.1.5.1 and 12.4.1.6 of the 305-B Storage Unit Permit Application.

#### 7.3.2.5 DOE-RL

Provide notification of releases to the National Response Center and to Ecology in accordance with the site-wide hazardous waste permit, 40 CFR 302.6, and WAC 173-303-145.

### 7.4 Implementation of the BEP

The overall responsibility for implementation of this Procedure lies with the Building Emergency Director (BED) or the designated alternates. The BED has the responsibilities of the Emergency Coordinator as named in WAC 173-303-360. The BED and alternates are on call 24 hours per day and have the authority to commit all necessary resources (both equipment and personnel) to respond to any facility emergency.

Response by an emergency coordinator is usually obtained through the PNNL Single Point-of-Contact at (509) 375-2400. The Single Point-of-Contact has been designated as the contact point to mobilize a response to any PNNL emergency on the Hanford Site. The Single Point-of-Contact is available at all times and has the responsibility to contact the BED or alternate to begin responses to emergencies under this procedure.

Due to the security requirements at the Hanford Site, DOE-RL does not submit names or phone numbers of personnel acting as emergency contacts as part of permit applications or other public documents. All emergency notifications to the BED, building managers, etc., are made through the PNNL Single Point-of-Contact. A complete Building Emergency Response Organization listing of positions, names work and home telephone numbers for the 305-B Storage Unit is maintained in a separate, internally controlled, facility document. Copies are distributed, as a minimum, to appropriate facility locations, the Single Point-of-Contact, and with the contingency plan at the 305-B Storage Unit.

The decision by the BED or alternate to implement this Procedure depends on whether an incident in progress may threaten human health or the environment. Immediately after being notified of an emergency, the BED or alternate will go to the site and evaluate the situation. Based on evaluation of the event, the BED or alternate will implement this procedure to the extent necessary to protect human health or the environment.

Incidents discovered by unit personnel trained in emergency response may be responded to according to these procedures prior to the arrival of the BED. However, immediate notification of the BED is still required prior to implementing these procedures.

## 7.5 Facility Hazards

### 7.5.1 Hazardous Materials

This facility contains hazardous material typically found in an industrial facility including:

- Chemical hazards such as corrosives, oxidizers, flammable solids and liquids, poisons, etc.,
- Radioactive materials,
- Hazardous wastes,
- Radioactive mixed wastes

### 7.5.2 Physical (Industrial) Hazards

This facility may contain industrial hazards such as high-voltage equipment, and overhead hazards.

### 7.5.3 Dangerous Mixed Waste

Radioactive mixed waste (RMW) is stored in the basement of the original wing of the building in an area approximately 18' x 32'. The RMW area is also equipped with a secondary containment berm to prevent migration of spilled wastes. Flammable RMW cannot be stored below grade (per Uniform Fire Code) and is stored in an independent area on the first floor of the original wing in individual secondary containment structures.

### 7.5.4 Radioactive Materials

Refer to Section 5.3.

### 7.5.5 Criticality

Not applicable.

## 7.6 Potential Emergency Conditions and Appropriate Response

### 7.6.1 Facility Operations Emergencies

For an Off-Normal Event or Emergency Condition not specifically addressed, call the PNNL Single-Point-of-Contact on 375-2400. PNNL staff who observe a facility condition that may include, but not limited to the following: smoke, heat, vibration, or unusual sounds such as hissing should leave the area immediately and make the appropriate emergency notifications. The following guidance is offered for specific listed incidents:

#### 7.6.1.1 Loss of Utilities

In the event of power failure, all containers of waste will be checked for closure and, if the duration of the outage exceeds 30 minutes, will be returned to their storage cells if they have been removed for labpacking or bulking. Facility equipment will be shut down to allow orderly restoration of power.

In a power failure incident, the Building Manager and the BED are to be notified. The Building Manager is responsible to arrange for restoration of power service to the unit. The BED is responsible to evaluate whether the Contingency Plan should be implemented or whether an evacuation is advisable. If the Contingency Plan is not implemented immediately, site personnel may be required to monitor the unit for continuing release potential during extreme temperature periods. The BED will determine the need for, and extent of, any such monitoring, in consultation with an industrial hygienist if appropriate.

In the event of power loss to site equipment, which results in failure of the equipment, the Building Manager is to be contacted to arrange for repair of the affected equipment and/or provide restoration of power. The BED should be contacted in the event that any failure results in a release or potential release to the environment as described in Section 7.4.

#### 7.6.1.2 Major Process Disruption/Loss of Building Control

Not applicable.

#### 7.6.1.3 Pressure Release

Not applicable.

#### 7.6.1.4 Fire and/or Explosion

In the event of a fire or explosion, the discoverer will pull one of the manual fire alarms and call the Single Point-of-Contact. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) is also possible. The personnel operating the facility are trained in the use of portable fire extinguishers. They will use their best judgment whether to extinguish a fire or evacuate. Under no circumstances will personnel remain in the facility to extinguish a fire if unusual hazards exist. The following actions will be taken in the event of a fire or explosion:

1. Upon actuation of the fire alarm, personnel will shut down equipment, secure wastes, and lock up classified documents (or carry them with them), ONLY if time permits.

2. The alarm automatically signals both the 300 Area HFD station and the Hanford Patrol Headquarters. Both will respond immediately.

3. Personnel shall leave 305-B Storage Unit by the nearest safe exit, and move upwind, keeping the driveway clear.

4. The Single Point-of-Contact shall be immediately notified, who shall in turn notify the BED (or alternate).

5. The BED will go directly to the scene.

6. The BED will obtain all necessary information pertaining to the incident.

7. The BED will contact the Single Point-of-Contact and advise whether to notify the PNNL Occurrence Representative, depending on the severity of the event. Inform the Single Point-of-Contact as to the extent of the emergency (including estimates of dangerous waste or RMW quantities released to the environment) and any actions necessary to protect nearby facilities.

8. Activation of the Emergency Operations Center sets into motion the notification process for DOE, other Hanford contractors, and outside agencies.

9. The Hanford Patrol/Benton County Sheriffs Office will set up roadblocks within the area to route traffic away from the emergency scene.

10. Emergency medical technicians will remove injured personnel to a safe location, apply first aid, and prepare for transport to the medical department (DOE/HEHF) or to hospitals.

11. The HFD will extinguish the fire.

12. All emergency equipment will be cleaned and restored for its intended use immediately after completion of cleanup procedures.

#### 7.6.1.5 Hazardous Material Spill

In addition to the foregoing contingency plan provisions, the following specific actions may be taken for leaks or spills from containers at the unit:

- Container leaks will be stopped as soon as possible through tightening closures, tipping the container to stop the leak, use of plugging or patching materials, or overpacking. Appropriate protective equipment will be used.
- If it is inadvisable to approach the container, build a containment of absorbent materials and restrict access pending notification of the BED and implementation of the contingency plan.
- Contents of leaking containers may be transferred to appropriate non-leaking containers. Transfer procedures for fire safety will be followed for ignitable or reactive wastes (e.g., use of non-sparking tools, bonding and grounding of containers, isolation of ignition sources, and use of explosion-proof electrical equipment).
- Overpacked containers will be marked and labeled in the same manner as the contents. All containers of spill debris; recovered product, etc., will be managed in the same manner as waste containers received from outside the unit. Overpacks in use at the facility will be marked with information pertaining to their contents, and noting whether the container inside the overpack, is leaking or is in good condition.

#### 7.6.1.6 Dangerous/Mixed Waste Spill

The initial response to any emergency will be to immediately protect the health and safety of persons in the immediate area. Identification, containment, treatment, and disposal assessment will be the secondary response.

#### 7.6.1.7 Response to Minor Spills or Releases

Unit personnel will generally perform immediate cleanup of minor spills or releases using unit equipment, absorbents and emergency equipment noted in Section 7.10. Personnel detecting such spills or releases shall contact the PNNL Single Point-of-Contact (375-2400) to notify of the detection of such release and arrange for notification of the BED. For spills or releases occurring within individual storage cells during routine handling and storage, refer to Chapter 4, Section 4.1.1.8 of the 305-B Storage Unit Part B Permit Application.

A spill or release of hazardous material or dangerous waste is considered "minor" if all of the following are true:

- The spill is minor in size (generally less than five gallons of liquid or 50 lbs. of solids);
- The composition of the material or waste is known or can be immediately determined from label, manifest, MSDS, or disposal request information;
- The spill does not threaten the health and safety of building occupants, i.e., an evacuation is not necessary;
- Unit personnel have received appropriate training in accordance with Chapter 8, Section 8.1.5 of the 305-B Storage Unit Permit Application; and
- Unit personnel have appropriate protective equipment, respiratory protection, and emergency response equipment to immediately respond and remediate the spill or release.

If any of the foregoing conditions are not met the provisions of Section 7.6.1.6.2., Major Dangerous Waste and/or RMW Spill or Material Release should be followed.

**7.6.1.7.1 Response to Major Dangerous Waste and/or RMW Spill or Material Release**

The following actions will be taken in the event of a major release:

<u>Discoverer</u>

1. If within the unit, notify unit personnel of discovery of spill or release by sounding the fire alarm.
2. Immediately notify the PNNL Single Point-of-Contact (375-2400) and provide all known information, including:
   - Name(s) of chemical(s) involved and amount(s) spilled, on fire, or otherwise involved, or threatened by, the incident.
   - Name and callback phone number of person reporting the incident.
   - Location of spill or discharge (pinpoint as closely as possible).
   - Time incident began or was discovered.
   - Where the materials involved are going or may go, such as into secondary containment, under doors, through air ducts, etc.
   - Source and cause, if known, of spill or discharge.
   - Name(s) of anyone contaminated or injured in connection with the incident.
   - Any corrective actions in progress.
   - Anyone else who the caller has contacted.

3. Take action to contain and/or stop the spill if all of the following are true:
   - The identity of the substance(s) involved is known;
   - Appropriate protective equipment and control/cleanup supplies are immediately available;
   - The employee has the proper training and can perform the action(s) contemplated without assistance, or assistance is immediately available from other trained unit employees; and
   - Time is of the essence; i.e., the spill/discharge will get worse if immediate action is not taken.

If any of the above conditions are not met, or there is doubt, the employee should evacuate the area and remain outside the unit and upwind from it pending the arrival of the BED. He/she should remain available for consultation with the BED, HFD, or other emergency Management personnel.

**Single Point-of-Contact**

1. The Single Point-of-Contact will notify the BED or one of his alternates if the BED cannot be immediately reached, to arrange immediate response to the incident.
2. The Single Point-of-Contact will arrange for immediate response from HFD for fire or ambulance services as needed based on the report of the discoverer.
3. The Single Point-of-Contact will notify EMSD of the spill or release incident.
4. The Single Point-of-Contact will support the BED in providing further notification and coordination of response activities if needed. Potential activities requiring Single Point-of-Contact participation are:
   - Activate the general evacuation alarm for the 300 Area, if the BED determines that evacuation is necessary.
   - Notify the Emergency Operations Center (EOC) operated for DOE by Project Hanford Management Contractor (PHMC) if evacuation of the 300 Area or adjacent areas is necessary.
   - Notify the DOE-RL Emergency Operations Center in accordance with the Hanford Emergency Management Plan if necessary to evacuate areas lying outside the Hanford Site.
   - Any other activities found in the DOE-RL Hanford Emergency Management Plan.

**Building Emergency Director (BED) (or alternate)**

1. Go directly to the unit to coordinate further activity. Take command of the scene from discovering unit employee.
2. Obtain all immediately available information pertaining to the incident. Determine need for assistance from agencies and arrange for their mobilization and response through the Single Point-of-Contact.
3. If building evacuation is necessary, sound the fire alarm.
4. Arrange for care of any injured employees, and provide for any additional help necessary to safely evacuate any disabled staff or visitors.

5. If a threat to surrounding facilities/operations exists. The BED (or alternate) will identify the hazards and any appropriate actions needed in the case of an unplanned release and activate the Emergency Operations Center if required.

6. Provide for event notification in accordance with Section 7.3.2.6.

7. Maintain access control at the site by keeping unauthorized personnel and vehicles away from the area. Security personnel may be used to assist in site control if control of the boundary is difficult, e.g., repeated incursions. In determining controlled-access areas, be sure to consider environmental factors such as wind velocity and direction.

8. Remain available to fire, police, and other authorities on scene and provide all required information. If round-the-clock work is anticipated, enlist the assistance of alternate BEDs to provide coverage. Make no comment to media unless authorized to do so. Refer media inquiries to the Media Relations office.

9. If remediation is performed by unit personnel, ensure use of proper protective equipment, proper remedial techniques (including ignition source control for flammable spills), and decontamination procedures by all involved personnel. Consult a PNNL industrial hygienist for assistance in determining necessary equipment or procedures.

10. If remediation is performed by outside agencies such as the Hanford Hazardous Materials Response Team or other remedial contractors, remain at the site to oversee activities and provide information.

11. Ensure proper containerization, packaging, and labeling of recovered spill materials and overpacked containers.

12. Ensure decontamination (or restocking) and restoration of emergency equipment used in the spill remediation prior to resumption of unit operations in compliance with Chapter 12, Section 12.4.1.5.3 of the 305-B Storage Unit Part B Permit Application.

13. Provide reports after the incident in accordance with Chapter 12, Section 12.4.1.6. of the 305-B Storage Unit Part B Permit Application.

#### 7.6.1.8 Transportation and/or Packaging Incidents

- When a damaged shipment of hazardous material or dangerous waste arrives at 305-B Storage Unit, the shipment is unacceptable for receipt under the criteria identified in the 305-B Storage Unit Part B Permit Application.
- Treat any release from the package as a hazardous material spill and perform response actions per Section 7.6.1.6 Dangerous/Mixed Waste spill
- Do not move the shipment.
- Notify the generator of the damaged shipment and obtain any chemical information necessary to assist in the response.

#### 7.6.1.9 Unusual, Irritating, or Strong Odors

##### 7.6.1.9.1 Inside of the Facility

If an unusual, irritating, or strong odor is detected, and the person detecting it has reason to believe that the odor may be the result of an uncontrolled release of a toxic or dangerous material, they shall:

- Immediately activate the building fire alarm system to evacuate the building, and

- *Notify the Single Point-of-Contact, the building manager, and cognizant line management.*

*In the event that the discoverer has knowledge of the source and scope of the release and believes that the* release poses no immediate threat to others, the release shall immediately be reported to the building *manager and to the discoverer's manager. Measures shall be taken to contain the release and ventilate the* area, if safe and advisable to do so.

In the event that an unusual odor is detected within the facility, and the source of the odor is unknown, the BED must consider whether the facility should be evacuated.

#### 7.6.1.9.2 Outside of the Facility

*If an unusual odor is detected and believed to come from outside the* 305-B Building, the following actions should be taken:

- Notify 375-2400.
- Determine wind direction. The duty forecaster at 373-2716 can give the immediate wind direction in the 300 Area.
- Evacuate building to an upwind position regardless of primary designated Staging Area.
- *In some cases it may be better to remain inside and shut down the* HVAC System. The Building Emergency Director will determine response.

#### 7.6.1.10 Radiological Material Release

Same as Section 7.6.1.6., Dangerous/Mixed Waste Spill.

#### 7.6.1.11 Criticality

Not applicable.

### 7.6.2 Identification of Hazardous Materials in and around Facility

305-B Storage Unit contains both radioactive and hazardous wastes that pose a potential hazard to the public, adjacent facilities, personnel, programs and the environment. Facilities adjacent to 305-B Storage Unit may contain hazardous material typically found in an industrial facility including: chemical hazards *such as corrosives, oxidizers, flammable solids and liquids, poisons, etc., radioactive materials, hazardous* wastes, and radioactive mixed wastes. They also may contain industrial hazards such as high-voltage equipment, high-temperature equipment, high-speed equipment (such as drill presses, lathes, drive belts), and overhead hazards. However, none of these facilities pose an imminent threat to 305-B Storage Unit in the event of an emergency.

### 7.6.3 Natural Phenomena

Natural phenomena or events including range fire, flood, high winds/tornado, volcanic eruption/ashfall, seismic events, etc may occur at any time. Follow directions given by Crash Alarm Telephone or 305-B Storage Unit Building Emergency Director.

#### 7.6.3.1 Seismic Event

The 305-B Storage Unit is located in Benton County, Washington, and is not within one of the political jurisdictions identified in Appendix VI of Title 40 Code of Federal regulations (CFR) Part 264 (EPA 1988). Therefore, no further demonstration of compliance with the seismic standard is required.

#### 7.6.3.2 Volcanic Eruption/Ashfall

Follow directions given by Crash Alarm Telephone or 305-B Storage Unit Building Emergency Director.

#### 7.6.3.3 High Winds/Tornadoes

Follow directions given by Crash Alarm Telephone or 305-B Storage Unit Building Emergency Director.

#### 7.6.3.4 Flood

The 305-B Storage Unit is located in the 300 Area, which is adjacent to the Columbia River, approximately at river mile 345. Floods of the Columbia River were, therefore, considered for determining compliance with floodplain standards. Floods of other water bodies (i.e., the Yakima River, ephemeral streams on the Hanford Site) were not considered because of their great distance when compared to the distance to the Columbia River.

One hundred-year floodplain is identified in flood insurance rate maps developed by the Federal Emergency Management Agency (FEMA). The FEMA maps for Benton County, Washington, do not include the Hanford Site. Determination of whether 305-B Storage Unit is located in a 100-year floodplain, therefore, was made by comparing the land surface elevation at 305-B Storage Unit with the nearest downstream 100-year flood base elevation identified on the FEMA maps for Benton County. The nearest 100-year floodplain identified on the Benton County FEMA maps is at Columbia Point, approximately nine miles downstream of 305-B Storage Unit at river mile 336. The FEMA map for this area (FEMA 1982) identifies a 100-year flood base elevation of 352 ft above mean sea level (AMSL). This elevation is significantly below the elevation of 305-B Storage Unit, which is 387 ft AMSL (see topographic maps in Appendix 2A).

The potential for the 305-B Storage Unit to be inundated during a flood was also evaluated by comparison to the maximum probable flood for the Columbia River, which is greater than the 100-year flood level.

#### 7.6.3.5 Range Fire

Follow directions given by Crash Alarm Telephone or 305-B Storage Unit Building Emergency Director.

### 7.6.4 Security Contingencies

#### 7.6.4.1 Bomb Threats

- When condition is observed or bomb threat received, notify the PNNL Single Point-of-Contact 375-2400 or Building Emergency Director.
- If necessary, clear the area of personnel
- Do not move any suspicious objects
- Post warnings if applicable
- Provide Emergency Responders with Appropriate Information

If a Telephone Bomb Threat is received record the exact message and attempt to obtain the following information:

- When will it go off?
- Where is it located?
- What does it look like?

- What kind is it?
- Why was it placed?
- How do you know so much about it?
- Who put it there?
- Where are you calling from?
- What is your name and address?

**Note:** After receiving the information notify the PNNL Single Point-of-Contact 375-2400, give the information obtained from the caller and then notify the BED. If you receive a Written Bomb Threat, Notify the PNNL Single Point-of-Contact 375-2400 and provide the Written Bomb Threat to PNNL Security Personnel.

#### 7.6.4.2 Hostage Situation/Armed Intruder

- When condition is observed, notify the PNNL Single Point-of-Contact 375-2400 or Building Emergency Director.
- If necessary, clear the area of personnel
- Do not move any suspicious objects
- Post warnings if applicable
- Provide emergency responders with appropriate information
- Follow the instructions of the BED and/or security

## 7.7 Facility Take Cover – Shutdown of HVAC

If there is a potential for a hazardous plume to be drawn into the building -OR- if, the Patrol Operations Center (POC) directs securing the HVAC via the Single-Point of Contact for PNNL at 375-2400:

- The BED or Alternate BED will contact the Power Operator on duty and request that the building HVAC systems be secured for emergency protective actions.
- Notify the BED when HVAC shut down is complete.

### 7.7.1 Local Shutdown Using Power Operator, BED, or Alternate BED

If there is a potential for a hazardous plume to be drawn into the building -OR- if, the Patrol Operations Center (POC) directs securing the HVAC via the Single Point-of-Contact for PNNL at 375-2400:

The BED or Alternate BED will contact the Power Operator on duty and request that the building HVAC System be secured for emergency protective actions.

If the power operator cannot respond to the Building, the BED or Alternate will shut down the two (one for the highbay and one for the office area) HVAC systems using the main disconnects located on the north wall in the 305-B Storage Unit highbay.

Notify the BED and the Power Operator when HVAC shut down is complete.

## 7.8 Utility Disconnects Locations

Utility disconnects may be necessary under extreme emergency conditions. The Building Emergency Director will determine if utility disconnects are necessary. Location of the utility disconnects or valves are described below:

### 7.8.1 Compressed Air

*Plant air and shut off valves are located behind cell 5 in the southwest corner of the highbay area.*

### 7.8.2 Sanitary and Process Water

Water lines and shut-off valves are located behind the bulking module in the southwest corner of the highbay area.

### 7.8.3 Main Electrical Power

There are three separate main electrical disconnects located in 305-B Storage Unit. One is located on the north wall of the highbay area. The second is located on the east wall of the lowbay area, and the third is located on the east wall in the original wing of the building, leading to the basement.

### 7.8.4 HVAC Systems

The main disconnects switches to the two HVAC systems (one for the highbay and one for the office area) are located on the north wall in the 305-B Storage Unit highbay.

## 7.9 Termination, Incident Recovery, and Restart

### 7.9.1 Termination

The Incident Commander in consultation with the 305-B Storage Unit Building Emergency Director will recommend termination of the event when conditions indicate that it is safe to do so.

### 7.9.2 Prevention of Recurrence or Spread of Fires, Explosions, or Releases

The BED is responsible for taking the steps necessary to ensure that a secondary release, fire, or explosion does not occur after the initial incident. Procedures that will be implemented may include:

- Inspection of containment for leaks, cracks, or other damage
- Inspection for toxic vapor generation
- Isolation of residual waste materials and debris
- Reactivation of adjacent operations in affected areas only after cleanup of residual waste materials is achieved

### 7.9.3 Recovery

A Recovery Team, consisting of the Incident Commander, 305-B Storage Unit Building Emergency Director, and appropriate representation of all facility interests, will develop and recommend a recovery plan. A recovery plan is needed following an event when further risk could be introduced to personnel, a facility, or the environment through recovery action and/or to maximize the preservation of evidence.

The recovery plan will be reviewed and approved by cognizant PNNL line management and EMSD staff, meeting the requirements of PNNL-MA-110, Section 9.0, Termination, Re-entry, and Recovery. Restart of operations must be performed in accordance with the approved plan. For emergencies not involving activation of the Emergency Operations Center, the BED is responsible for ensuring that conditions are restored to normal before operations are resumed

#### 7.9.3.1 Storage and Treatment of Released Material

Restart of operations after an emergency is conducted in accordance with established procedures for recovery from off-normal events. Treatment and/or storage and disposal of released material and contaminated debris is part of the recovery process leading to restart.

Immediately after an emergency, the BED or the recovery organization will make arrangements for the cleanup phase. Procedures for treatment, storage, and/or disposal of released material and contaminated debris are implemented at this time.

Released material and contaminated debris will be managed in the same manner as wastes received from outside the unit (see Chapter 4, Section 4.3 of the 305-B Storage Unit Part B Permit Application for procedures). All waste so generated will be containerized in drums or other appropriate containers and stored in an appropriate storage area pending analysis and determination of final treatment/disposal requirements. Unit operations personnel will take cleanup actions or other personnel meeting the training requirements of Chapter 8 of the 305-B Storage Unit Part B Permit Application. Actions to be taken may include, but are not limited to, any of the following.

- Neutralization of corrosive spills
- Chemical treatment of reactive materials to reduce hazard
- Overpacking or transfer of contents from leaking containers
- Using absorbents to contain and/or absorb leaking liquids for containerization and disposal
- Decontamination of solid surfaces impacted by released material, e.g., intact containers, facility equipment, floors, containment systems, etc.
- Disposal of contaminated porous materials which cannot be decontaminated, and any contaminated soil
- Containerization and sampling of recovered materials for classification and determination of proper disposal technique
- Follow up sampling of decontaminated surfaces to determine adequacy of cleanup techniques as appropriate.

Wastes from cleanup activities will be analyzed and stored in the same manner as are wastes received from outside the unit, in the manner prescribed in Chapter 4 of the 305-B Storage Unit Part B Permit Application. Incompatible wastes will not be placed in the same container. Containers of waste will be placed in storage areas appropriate for their compatibility class.

If it is determined that incompatibility of wastes was a factor in the incident, the BED or the recovery organization will ensure that the cause is corrected. Corrective examples would be modification of an incompatibility chart, or increased scrutiny of wastes from a generating unit (in accordance with Chapter 3, Section 3.2 of the 305-B Storage Unit Part B Permit Application) when incorrectly designated wastes caused or contributed to an incident.

#### 7.9.3.2 Post-Emergency Equipment Maintenance

All equipment used during an incident will be decontaminated (if practicable) or disposed of as spill debris. Decontaminated equipment will be checked for proper operation prior to storage for subsequent use. Consumables and disposed materials will be restocked in the quantities shown in the inventories of Section 7.10.4., Fire extinguishers will be recharged or replaced.

The BED is responsible to ensure that all equipment is cleaned and fit for its intended use prior to the resumption of operations. Depleted stocks of neutralizing and absorbing materials will be replenished, self-contained breathing apparatus (SCBAs) cleaned and refilled, protective clothing cleaned or disposed and restocked, etc. Notification of state and local authorities will be made through DOE-RL of completion of cleanup, decontamination and emergency equipment re-supply activities pursuant to WAC 173-303-360(2)(j). Upon notification and approval of PNNL line management, normal facility operations may be resumed.

### 7.9.4 Required Reports [G-8]

Three types of written post-incident reports, summarized below are required for incidents at the 305-B Storage Unit.

#### 7.9.4.1 Report to Ecology/EPA

Within 15 days of the incident, a written report will be submitted to Ecology concerning the incident. The report must include:

- Name, address, and telephone number of DOE-RL contact;
- Name, address, and telephone number of 305-B Storage Unit;
- Date, time, and type of incident (e.g., fire, explosion);
- Name and quantity of material(s) involved;
- The extent of any injuries;
- Assessment of any actual or potential hazards to human health or the environment caused by the incident;
- Estimated quantity and disposition of recovered material that resulted from the incident;
- Cause of the incident; and
- *Description of corrective action taken to prevent recurrence of the incident.*

#### 7.9.4.2 DOE Occurrence Reporting

Under DOE Order 232.1A and HFID 232.1B an occurrence report is required for incidents occurring at the 305-B Storage Unit involving hazardous materials release, fire, etc. Specific details of this reporting system are found in the Order. To summarize, the BED is responsible to file the following occurrence reports with DOE-RL under the Order:

- Within 24 hours of discovery, file a Notification Report.
- File an updated Occurrence Report whenever significant new information relating to the incident becomes available.
- File a final Occurrence Report when cause of the incident has been analyzed, root cause and contributing causes determined, corrective actions determined and scheduled, and "lessons learned" identified.

#### 7.9.4.3 Off-Normal Event Reporting

Under off-normal event reporting procedures, occurrences shall be promptly investigated, reported, and analyzed to ensure that effective corrective actions are taken in compliance with contractual, statutory, and corporate requirements. All incidents are recorded in the building logbook. In the DOE reporting system, four levels of incidents are described in descending order of severity: emergency, unusual occurrence, off-normal occurrences, and logbook entry only.

An "off-normal event" is a significant deviation from normal operation that requires categorization and reporting as noted above. PNNL management is required to evaluate an event to determine the depth of investigation and level of reporting required.

Reporting of emergencies, unusual occurrences, and off-normal occurrences takes place as described under Section 7.9.3.2.

The BED is responsible for investigating each event in his/her area(s) of responsibility and submitting the appropriate report.

## 7.10 Emergency Equipment (crash alarm phones, fire extinguishers, etc.)

Support equipment available to assist in responding to an emergency can be found by referring to DOE/RL 94-02, Section 10.2, and the HFD emergency equipment listing in Appendix C of 94-02.

<u>**Hanford Site Emergency Equipment**</u>

The Hanford Site has fire and patrol personnel trained and equipped to respond in emergency situations. These personnel are employees of the site-operating contractor. The HFD Hazardous Material Response Team is trained for mobilization and control of hazardous material emergencies. The HFD will take control of the incident scene until the incident is under control and personnel rescue is complete

The Hanford Patrol provides support to the Fire Department during an incident, including such activities as activation of area crash alarm telephone systems or area sirens (for evacuation or take cover), access control, traffic control, and emergency notifications.

If an emergency threatens other facilities and/or there is a danger of release of hazardous materials to the environment, the HFD will respond. The HFD will coordinate protective response actions and notifications, and furnish any necessary technical assistance.

### 7.10.1 Portable Emergency Equipment

- Portable Fire Extinguishers are located throughout the facility. These locations are identified in Exhibit 7-1 "305-B Storage Unit Emergency Equipment Locations"

- A Mobile Command Post Vehicle can be obtained via HFD main telephone number (373-2230). The HFD Battalion Commander will approve and dispatch vehicle.

### 7.10.2 Communications equipment/warning systems

- Fire Alarm Pull Boxes are located at every exit throughout the facility. All locations are shown on Exhibit 7-1 "305-B Storage Unit Emergency Equipment Locations".

- The Crash Alarm Phone is located in the low-bay conference room area of the 305-B Storage Unit.

### 7.10.3 Personal Protective Equipment (PPE)

The unit has a safety shower and eyewash unit at each end of the high bay. Drainage from these units flows into the containment trenches. In addition to these units, a portable eyewash unit is maintained at the protective equipment storage area just outside the high bay, adjacent to the office area. These eyewash/shower units are inspected for clear and unobstructed accesses weekly in accordance with Chapter 6, Section 6.2 of the 305-B Storage Unit Part B Permit Application.

Protective clothing and respiratory protective equipment are maintained at the facility for use during both routine and emergency operations. This protective equipment includes at a minimum:

- 6 sets of chemically resistant suits, aprons, boots, and gloves
- 20 protective glasses
- 5 pair chemical goggles
- 4 face shields
- 4 full face respirators
- Respirator cartridges (variety)
- 3 self-contained breathing apparatus (30 minute type).

This protective equipment is stored in cabinets located outside of the high bay east entrance. Personnel assigned to 305-B Storage Unit are available to assist other trained personnel (e.g., firefighters) in emergency situations or possible immediately dangerous to life or health spill cleanup situations.

### 7.10.4 Spill Control and Containment Supplies

Supplies of absorbent pillows are located in the high bay operating area near the east entrance. These pillows absorb organic or inorganic materials and have a rated absorption capacity of approximately one-liter of waste each. They may be used for barriers to contain liquid spills as well as for absorbent purposes. The work area also has an ample supply of diatomaceous earth or vermiculite for absorption of liquid waste spills. Neutralizing absorbent is available for response to acid or caustic spills. A supply of empty drums (DOT UN1A1 closed head and DOT UN1A2 open head) and salvage drums (overpacks) is maintained in the high bay area along with brooms, shovels, and miscellaneous spill response supplies.

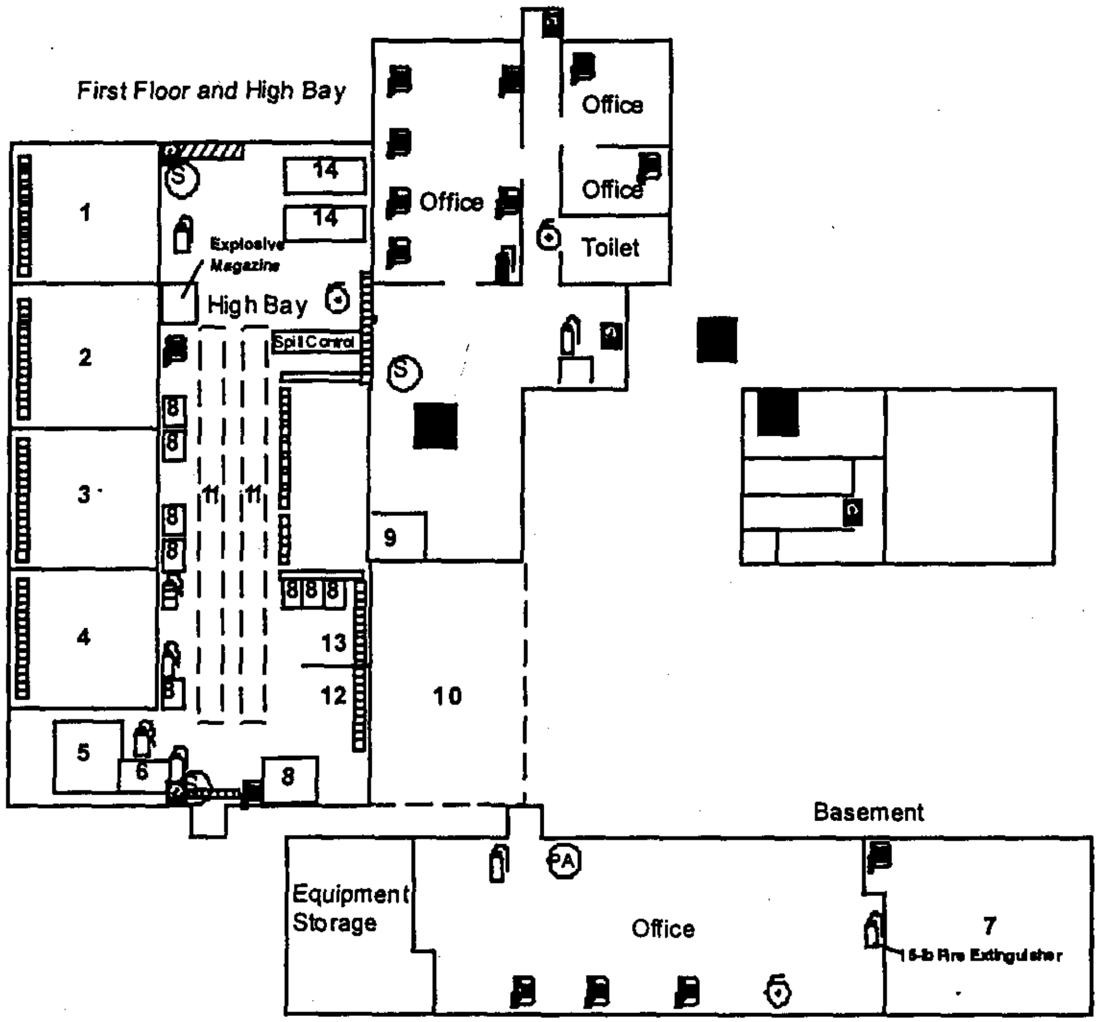
## 7.11 Evacuation of Persons with a Disability or Visitors

The 305-B Storage Unit has an evacuation plan, which includes emergency signal identification and staging area location. In the event an evacuation is required, 305-B Storage Unit personnel depart by one of the exit doors noted in Figure 7-2 and proceed through the north gate. Personnel are to assemble in the north parking lot Figure 7.3, Lane 2 accountability area for accounting. If the north gate is blocked by the emergency, personnel may escape through the Apple Street (west) gate opening to Stevens Drive or the south gate.

The safety of building visitors is the responsibility of the facility host, who shall ensure that visitors are provided a safe and orderly evacuation. The facility host will report the visitor status to the Staging Area Supervisor as soon, as is practical after the evacuation.

## 7.12 Exhibits

**Exhibit 7.1. 305-B Storage Unit Emergency Equipment Locations**




Legend

1. Acids, Oxidizers
2. Poisons, Class 9's
3. Alkalines, WSDW, Organic Peroxides
4. Organics and Compressed Aerosols
5. Flammable Liquid Bulking Module and compressed gases
6. Asbestos Cabinet
7. RMW Storage Cell
8. Flammable Storage
9. Small Quantity Flammable RMW
10. Outdoor Non-Regulated Drum Storage
11. WSDW/ORM/Non-Reg Drums
12. Oxidizer Drums
13. Acid Drums
14. Alkaline Drums

Ⓢ Safety Shower/Eyewash
Phone
Fire Alarm Bell
Fire Alarm Pull Box
14-lb Halon Fire Extinguisher
10-lb ABC Fire Extinguisher
15-lb Class D Fire Extinguisher
Removable Access to Basement
Emergency Equipment Cabinet
Collection Sumps

**Exhibit 7.2. 305-B Storage Unit Building Evacuation Exits**

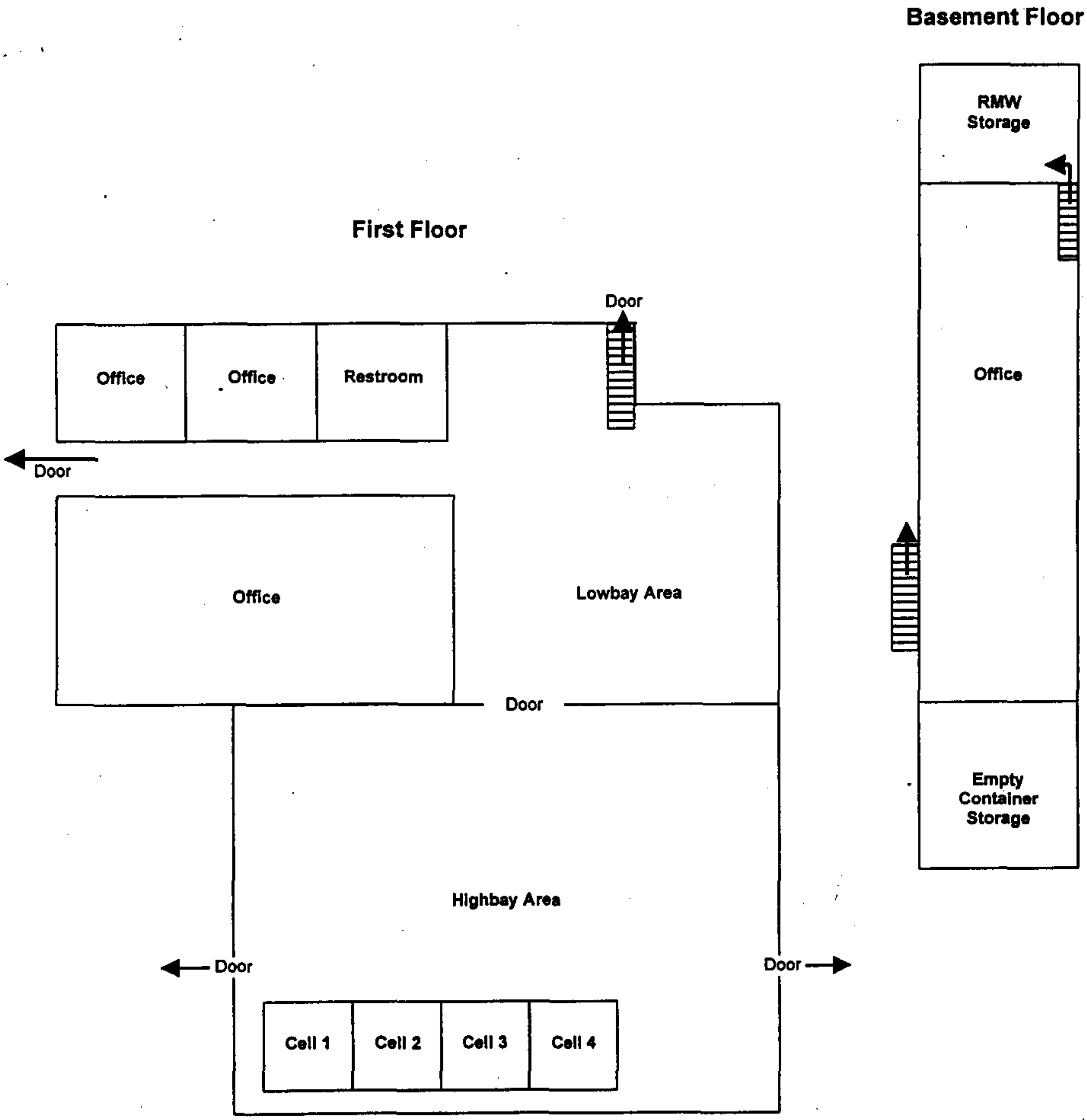
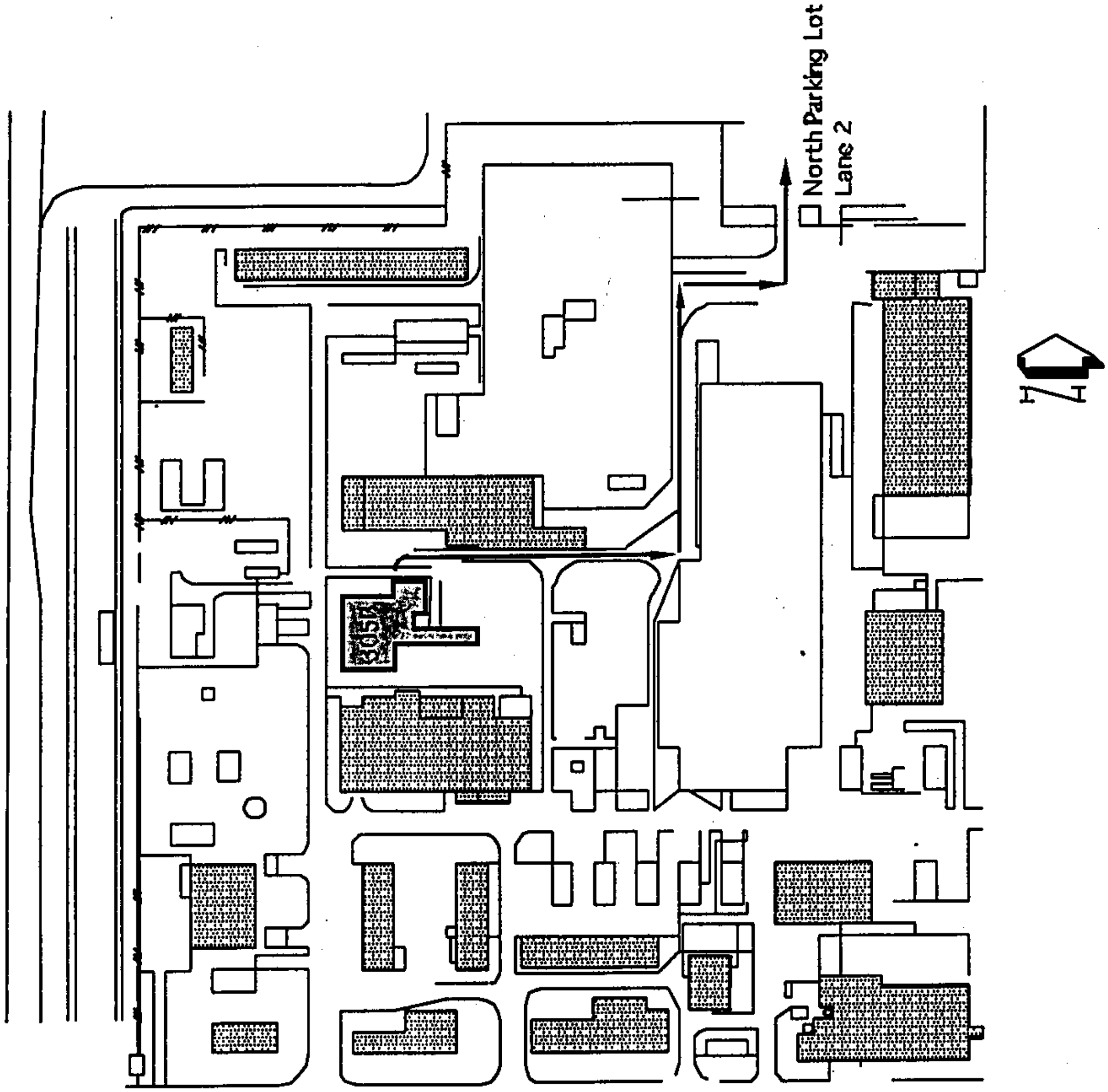


**Exhibit 7.3. 305-B Storage Unit Evacuation Route**



### 7.13 Distribution

Copies of the 305-B Storage Unit Building Emergency Procedures are maintained at the following locations:

- The 305-B Storage Unit
- HFD (300 Area Fire Station)
- The DOE-RL/ Emergency Operations Center, Federal Building, Richland
- The DOE-RL/Alternate Emergency Operations Center, 2420 Stevens Building, room 153
- All local police and fire departments, hospitals, and state and local response teams that may be called upon to provide emergency services.

# Hanford Facility RCRA Permit Modification Notification Forms

## Part III, Chapter 4 and Attachment 34
## Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility



## Index

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility | Permit Part & Chapter: Part III, Chapter 4 and Attachment 34 |
|---|---|

Description of Modification:

Chapter 5.0, Section 5.1:

**5.1 EXEMPTION FROM GROUNDWATER PROTECTION REQUIREMENTS [D-10a]**

A waiver from the groundwater monitoring requirements as allowed under WAC 173-303-645 is not requested. Therefore, the requirements of the Washington Administrate Code for groundwater monitoring are applicable to the LERF, except as modified in accordance with Ecology variance discussed in Section 5.5.

| Modification Class: [1 2 3] | Class 1 | Class[1] 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| A. K. Ikenberry 6/23/00 Date | M. J. Furman 7/6/00 Date | J. J. Wallace Date | L.E. Ruud Date |

[1] Class 1 modifications requiring prior Agency approval.

[2] *This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a* formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: **Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility** | Permit Part & Chapter: **Part III, Chapter 4 and Attachment 34** |
|---|---|

Description of Modification:

Chapter 5.0, Section 5.2:

## 5.2 INTERIM STATUS PERIOD GROUNDWATER MONITORING DATA [D-10b]

Information on interim status groundwater monitoring activities is provided in *Interim Status Ground Water Monitoring Plan for the 200 East Area Liquid Effluent Retention Facility* (WHC 1991a), in *Hanford Site Groundwater Monitoring for Fiscal Year 1999~~6~~* (PNNL 2000~~1997a~~), and in the Hanford Environmental Information System. Groundwater monitoring data provided no evidence that dangerous, non-radioactive constituent from the site has entered the groundwater. ~~There have been no significant detections of the indicator parameters that could be attributed to the LERF.~~

| Modification Class: [1 2 3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| A. K. Ikenberry | Date 4/27/00 | M. J. Furman | Date 7/6/00 | J. J. Wallace | Date | L.E. Ruud | Date |

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: **Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility** | Permit Part & Chapter: **Part III, Chapter 4 and Attachment 34** |
|---|---|

Description of Modification:

Chapter 5.0, Section 5.5:

## 5.5 DETECTION MONITORING PROGRAM [D-10e]

A groundwater monitoring program meeting the ~~I~~interim status groundwater monitoring standards will be implemented using one upgradient and two downgradient monitoring wells. ~~continued until a final status groundwater monitoring plan is submitted by DOE and approved by Ecology. The approved final status groundwater monitoring plan will be implemented immediately on approval and will be submitted for incorporation as a modification to the LERF permit. The ultimate goal is to develop a consolidated groundwater monitoring plan for the Hanford Site, which will supersede the LERF specific final status groundwater monitoring plan.~~ The groundwater monitoring requirements of 40 CFR 265 Subpart F will remain in effect except for downgradient well coverage, for which a variance has been granted. This approach has been approved by the Washington State Department of Ecology in a letter dated September 22, 1999 granting the U.S. Department of Energy a variance from interim status groundwater monitoring requirements. This monitoring program will remain in effect until an approved final status monitoring plan is designed and implemented through incorporation via permit modification. The variance for downgradient well coverage will end on the earlier of eighteen months after September 22, 1999, or the inability of another monitoring well to produce representative samples of groundwater. A revised final status monitoring plan including the process for transitioning to alternative monitoring as wells go dry will be submitted to Ecology for approval.

| Modification Class: [1 2 3] | Class 1 | Class[1] 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| A K Ikenberry (signature) | 6/23/00 | M J Furman (signature) | 7/6/00 | | | | |
| A. K. Ikenberry | Date | M. J. Furman | Date | J. J. Wallace | Date | L.E. Ruud | Date |

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: **Liquid Effluent Retention Facility and *200 Area Effluent Treatment Facility*** | Permit Part & Chapter: **Part III, Chapter 4 and Attachment 34** |
|---|---|

Description of Modification:

Permit Condition III.4.B.d:

III.4.B.c. Interim Status Ground Water Monitoring Plan for the 200 East Area Liquid Effluent Treatment Facility, WHC-SD-EN-AP-024, Rev. 1, ~~Liquid Effluent Retention Facility Final Ground Water Monitoring Plan, PNNL-11620~~, is an integral Part of this Permit and is to be added as Appendix 5A to the 200 Area Liquid Waste Complex Permit Application.

| Modification Class: [1 2 3] | Class 1 | Class[1] 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. *General Permit Provisions*

1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| Mike K. Ikenberry | 6/23/01 | M. J. Furman | 7/6/01 | | | | |
| A. K. Ikenberry | Date | M. J. Furman | Date | J. J. Wallace | Date | L.E. Ruud | Date |

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

## Hanford Facility RCRA Permit Modifications

## Part III, Chapter 4 and Attachment 34
## Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

Replacement Chapter

# Index

Chapter 5.0

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# 5.0 GROUNDWATER MONITORING [D-10]

## 5.1 EXEMPTION FROM GROUNDWATER PROTECTION REQUIREMENTS [D-10a]

A waiver from the groundwater monitoring requirements as allowed under WAC 173-303-645 is not requested. Therefore, the requirements of the Washington Administrate Code for groundwater monitoring are applicable to the LERF, except as modified in accordance with Ecology variance discussed in Section 5.5.

## 5.2 INTERIM STATUS PERIOD GROUNDWATER MONITORING DATA [D-10b]

Information on interim status groundwater monitoring activities is provided in *Interim Status Ground Water Monitoring Plan for the 200 East Area Liquid Effluent Retention Facility* (WHC 1991a), in *Hanford Site Groundwater Monitoring for Fiscal Year 1999* (PNNL 2000), and in the Hanford Environmental Information System. Groundwater monitoring data provided no evidence that dangerous, non-radioactive constituent from the site has entered the groundwater.

## 5.3 AQUIFER IDENTIFICATION [D-10c]

The characteristics of the uppermost aquifer beneath the LERF and the regional physiographic, geologic, and hydrogeologic setting of the LERF are summarized in Chapter 5.0 of the General Information Portion (DOE/RL-91-28).

## 5.4 CONTAMINANT PLUME DESCRIPTION [D-10d]

A description of the contaminant plumes existing beneath the 200 East Area and 200 West Area is provided in Chapter 5.0 of the General Information Portion (DOE/RL-91-28).

## 5.5 DETECTION MONITORING PROGRAM [D-10e]

A groundwater monitoring program meeting the interim status groundwater monitoring standards will be implemented using one upgradient and two downgradient monitoring wells The groundwater monitoring requirements of 40 CFR 265 Subpart F will remain in effect except for downgradient well coverage, for which a variance has been granted. This approach has been approved by the Washington State Department of Ecology in a letter dated September 22, 1999 granting the U.S. Department of Energy a variance from interim status groundwater monitoring requirements. This monitoring program will remain in effect until an approved final status monitoring plan is designed and implemented through incorporation via permit modification. The variance for downgradient well coverage will end on the earlier of eighteen months after September 22, 1999, or the inability of another monitoring well to produce representative samples of groundwater. A revised final status monitoring plan including the process for transitioning to alternative monitoring as wells go dry will be submitted to Ecology for approval.

## Index

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| **Unit:** **325 Hazardous Waste Treatment Units** | **Permit Part & Chapter:** **Part III, Chapter 6 and Attachment 36** |

Description of Modification:

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.

Replace Chapter 1.0 with attached Chapter 1.0.

| Modification Class: [1,2,3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions
   1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| A.K. Ikenberry 6/23/00 Date | for R.F. Christensen 6/29/00 Date | J. J. Wallace Date | L.E. Ruud Date |

---

[1]Class 1 *modifications requiring prior Agency approval.*

[2] *This is only an advanced notification of an intended Class* [1]1, 2, or 3 *modification, this should be followed* with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: | Permit Part & Chapter: |
|---|---|
| 325 Hazardous Waste Treatment Units | Part III, Chapter 6 and Attachment 36 |

Description of Modification:

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.
Section III.C.

*S01, T04, S02, T01*

*The 325 Hazardous Waste Treatment Units (325 HWTUs) consist of the Shielded Analytical Laboratory (SAL) which includes Rooms 32, 200, 201, 202,* and 203; the Hazardous Waste Treatment Unit (HWTU) encompassing Rooms 520 and 528 of the 325 Building, and the 325 ~~Collection/Loadout Station~~ Radioactive Liquid Waste Tank (RLWT) located in the southeast corner of the basement of the 325 Building. The 325 HWTUs began waste management operations in 1991 (SAL) and 1995 (HWTU). Up to 10,000 liters of dangerous and/or mixed waste may be stored in containers in the 325 HWTUs (S01). A maximum of 1514 liters of dangerous and/or mixed waste may be treated per day in containers in the 325 HWTUs (T04).

Liquid dangerous and/or mixed waste is transferred to tank storage via gravity drain lines located in the SAL (which drain into tank TK-1) and in Room 528 [which drain directly to the radioactive liquid waste system (RLWS)]. Tank TK-1 is drained via a jet system into the RLWS then to the RLWT ~~and The Collection/Loadout Station Tank will be utilized~~ is used to collect liquid dangerous and/or mixed waste. ~~after the RLWS is closed, and will be connected to existing drain lines. This tank will~~ The RLWT transfers collected liquid dangerous and/or mixed waste to a loadout station, where mobile containers ~~will be~~ are loaded to transfer the liquid dangerous and/or mixed waste to the Double-Shell Tank System. A maximum of 12,574 liters of dangerous and/or mixed waste may be stored in tanks in the *325 HWTUs (S02). A maximum of 12,574 liters of dangerous and/or mixed waste may be treated in tanks per day in the* 325 HWTUs (T01).

Dangerous and/or mixed waste treatments are generally conducted as small bench-scale operations except for in-tank treatments. Treatment processes utilized at the 325 HWTUs may include the following:

| | | | | | |
|---|---|---|---|---|---|
| T11 | Molten salt destructor | T35 | Centrifugation | T55 | Electrodialysis |
| T12 | Pyrolysis | T36 | Clarification | T56 | Electrolysis |
| T13 | Wet air oxidation | T37 | Coagulation | T57 | Evaporation |
| T14 | Calcination | T38 | Decanting | T58 | High gradient magnetic separation |
| T15 | Microwave discharge | T39 | Encapsulation | T59 | Leaching |
| T18 | Other thermal treatment | T40 | Filtration | T60 | Liquid ion exchange |
| T21 | Chemical fixation | T41 | Flocculation | T61 | Liquid-liquid extraction |
| T22 | Chemical oxidation | T42 | Flotation | T62 | Reverse osmosis |
| T23 | Chemical precipitation | T43 | Foaming | T63 | Solvent recovery |
| T24 | Chemical reduction | T44 | Sedimentation | T64 | Stripping |
| T25 | Chlorination | T45 | Thickening | T65 | Sand filter |
| T26 | Chlorinolysis | T46 | Ultrafiltration | T66 | Other removal technology |
| T27 | Cyanide destruction | T47 | Other separation technology | T67 | Activated sludge |
| T28 | Degradation | T48 | Absorption-molecular sieve | T69 | Aerobic tank |
| T29 | Detoxification | T49 | Activated carbon | T70 | Anaerobic lagoon or tank |
| T30 | Ion exchange | T50 | Blending | T71 | Composting |
| T31 | Neutralization | T51 | Catalysis | T74 | Thickening filter |
| T32 | Ozonation | T52 | Crystallization | T75 | Trickling filter |
| T33 | Photolysis | T53 | Dialysis | T77 | Other biological treatment |
| T34 | Other chemical treatment | T54 | Distillation | | |

| Modification Class: [1 2 3] | Class 1 | Class [1] 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| A.K. Ikenberry 6/23/00 | R.F. Christensen 6/29/00 | | |
| A.K. Ikenberry Date | R.F. Christensen Date | J. J. Wallace Date | L.E. Ruud Date |

[1]Class 1 *modifications requiring prior* Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

# Hanford Facility RCRA Permit Modification Notification Form

| Unit: | Permit Part & Chapter: |
|---|---|
| **325 Hazardous Waste Treatment Units** | **Part III, Chapter 6 and Attachment 36** |

Description of Modification:

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.

Section IV. Description of Dangerous Waste: Corrected typographical error.

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 485 | W | T | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 486 | W | T | 0 | ~~1~~2 | | ↓ | | | ↓ | ↓ | | | ↓ |

| Modification Class: [1 2 3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| A.K. Ikenberry | 6/23/00 | for R.F. Christensen | 6/29/00 | | | | |
| A.K. Ikenberry | Date | R.F. Christensen | Date | J. J. Wallace | Date | L.E. Ruud | Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| **Unit:**<br>**325 Hazardous Waste Treatment Units** | **Permit Part & Chapter:**<br>**Part III, Chapter 6 and Attachment 36** |

Description of Modification:

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.

Section IX.: Modified Date Signed block as follows:
Revision 4 signed
00/30/1997

Section X: Modified Date block as follows:
Date Revision 4 Signed

| Modification Class: [1 2 3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions
   1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| Mick Ikenberry | 6/23/00 | R.F. Christensen | 6/29/00 | | | | |
| A.K. Ikenberry | Date | for R.F. Christensen | Date | J. J. Wallace | Date | L.E. Ruud | Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| **Unit:** 325 Hazardous Waste Treatment Units | **Permit Part & Chapter:** Part III, Chapter 6 and Attachment 36 |

Description of Modification:

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.

**Figure 1:** Redrawn and identification number for figure updated.

**Figure 2:** Redrawn and identification number for figure updated. Modified title as follows:
325 Hazardous Waste Treatment Units

**Figure 3:** Revised to denote RPS and RLWS and identification number for figure updated. Modified title as follows:
Location of Shielded Analytical Laboratory Tank in Room 32 and ~~Proposed~~ Location of 325 Collection/Loadout Station Tank (basement) of the 325 Building.

**Figure 5:** Modified title as follows:
~~Proposed~~ 325 Collection/Loadout Station Tank.

| Modification Class: [1 2 3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation
A. General Permit Provisions
1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| A.K. Ikenberry 6/27/00 Date | R.F. Christensen for 6/29/00 Date | J. J. Wallace Date | L.E. Ruud Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| **Unit:**<br>**325 Hazardous Waste Treatment Units** | **Permit Part & Chapter:**<br>**Part III, Chapter 6 and Attaehment 36** |

*Description of Modification:*

Part A, Form 3: Replace the Part A, Form 3, Revision 4 with the attached Part A, Form 3, Revision 4A. The Part A, Form 3, was modified to reflect the installation of the Radioactive Liquid Waste Tank system.

**Photograph 1:** Modified titles as follows:
Hazardous Waste Treatment Units

**Photograph 2:** Modified titles as follows:
Hazardous Waste Treatment Units

**Photograph 3:** Modified titles as follows:
Hazardous Waste Treatment Units

**Photograph 6:** Corrected identification number for photograph.

**Photograph 8:** Corrected the photo taken date as follows:
(Photo Taken ~~1979~~ 1996)

**Photograph 9:** Replaced photograph with current photograph of installed RLWT. Modified title as follows::
~~Proposed~~ 325 Collection/Loadout Station Tank

| Modification Class: [1 2 3] | Class 1 | Class [1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions
1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| A.K. Ikenberry 6/23/00 Date | R.F. Christensen 6/29/00 Date<br>for | J. J. Wallace Date | L.E. Ruud Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| Unit: **325 Hazardous Waste Treatment Units** | Permit Part & Chapter: **Part III, Chapter 6 and Attachment 36** |

Description of Modification:

Chapters 2, 4, 6, and 11:

Replace Chapters 2, 4, 6, and 11 with the attached Chapters 2, 4, 6, and 11. These Chapters were modified to reflect the installation of the Radioactive Liquid Waste Tank system.

| Modification Class: [1 2 3] | Class 1 | Class[1] 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | | Reviewed by RL Program Office: | | Reviewed by Ecology: | | Reviewed by Ecology: | |
|---|---|---|---|---|---|---|---|
| A.K. Ikenberry | 6/23/00 | for R.F. Christensen | 6/29/00 | J. J. Wallace | | L.E. Ruud | |
| A.K. Ikenberry | Date | R.F. Christensen | Date | J. J. Wallace | Date | L.E. Ruud | Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

| Hanford Facility RCRA Permit Modification Notification Form | |
|---|---|
| Unit:<br>***325 Hazardous Waste Treatment Units*** | Permit Part & Chapter:<br>***Part III, Chapter 6 and Attachment 36*** |

Description of Modification:

Chapter 7:

Replace Chapter 7 with the attached Chapter 7.

| Modification Class: [1 2 3] | Class 1 | Class[1]1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Please check one of the Classes: | X | | | |

Relevant WAC 173-303-830, Appendix I Modification: A.1.

Enter wording of the modification from WAC 173-303-830, Appendix I citation

A. General Permit Provisions

1. Administrative and Informational changes.

| Submitted by Co-Operator: | Reviewed by RL Program Office: | Reviewed by Ecology: | Reviewed by Ecology: |
|---|---|---|---|
| Rick Ikenberry 6/23/00 | R Christensen 6/29/00 | | |
| A.K. Ikenberry Date | for R.F. Christensen Date | J. J. Wallace Date | L.E. Ruud Date |

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

<table>
<tr><td colspan="5">Hanford Facility RCRA Permit Modification Notification Form</td></tr>
<tr><td colspan="2">Unit:<br>325 Hazardous Waste Treatment Units</td><td colspan="3">Permit Part & Chapter:<br>Part III, Chapter 6 and Attachment 36</td></tr>
<tr><td colspan="5"><u>Description of Modification:</u><br>Appendix 7A:<br>Replace Appendix 7A with the attached Appendix 7A.</td></tr>
<tr><td colspan="2">Modification Class: [1 2 3]</td><td>Class 1</td><td>Class[1] 1</td><td>Class 2 | Class 3</td></tr>
<tr><td colspan="2">Please check one of the Classes:</td><td>X</td><td></td><td></td></tr>
<tr><td colspan="5">Relevant WAC 173-303-830, Appendix I Modification: A.1.</td></tr>
<tr><td colspan="5"><u>Enter wording of the modification from WAC 173-303-830, Appendix I citation</u><br>A. General Permit Provisions<br>1. Administrative and Informational changes.</td></tr>
<tr><td>Submitted by Co-Operator:<br>Alice K. Ikenberry 6/27/00<br>A.K. Ikenberry Date</td><td>Reviewed by RL Program Office:<br>R.F. Christensen 6/29/00<br>for R.F. Christensen Date</td><td>Reviewed by Ecology:<br><br>J. J. Wallace Date</td><td colspan="2">Reviewed by Ecology:<br><br>L.E. Ruud Date</td></tr>
</table>

[1]Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

[3] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to [1]1, if appropriate.

**Hanford Facility RCRA Permit Modifications**

**Part III, Chapter 6 and Attachment 36**
**325 Hazardous Waste Treatment Units**

Replacement Sections

# Index

# CONTENTS

# 1.0 PART A [A]

The following is the 325 Hazardous Waste Treatment Units (325 HWTUs) Part A, Form 3, history.

- Revision 0 of the Part A, Form 3, was submitted May 19, 1988.

- Revision 1 of the Part A, Form 3, submitted June 30, 1992.

- Revision 2 of the Part A, Form 3, March 1, 1993, more accurately defined the activities proposed to occur within the 325 portion (325 HWTU) of the 325/3100 Hazardous Waste Treatment Unit. Earlier revisions to the application limited the processes to be conducted in the 325 HWTU to stabilization and alkali metal treatments. The revised permit application specifies the treatments to be conducted in the 325 HWTU: pH adjustment, ion exchange, carbon absorption, oxidation, reduction, waste concentration by evaporation, precipitation, filtration, liquid/solids separation, catalytic destruction, grouting, encapsulation, and stabilization. Added waste codes inadvertently left out of Revision 1. Corrected the total storage capacity of the 325/3100 Hazardous Waste Treatment Unit to 5500 gallons to accurately reflect the combined storage capacity of both treatment portions. The storage capacity specified for the 325 HWTU was reduced from 1000 to 500 gallons.

- Revision 3 of the Part A, Form 3, December 2, 1994, deleted the 3100 Facility from the 325/3100 Hazardous Waste Treatment Unit Part A (Form 3) Permit Application. The 3100 facility project has no funding, no activities identified for it, and has never existed. Consolidated the 325 Shielded Analytical Laboratory (SAL) and activities under the 325 Hazardous Waste Treatment Unit Part A (Form 3). The 325 SAL was operating under Physical/Chemical Treatment Facilities Part A (Form 3). This action allowed the Pacific Northwest Laboratory (PNL) and the U.S. Department of Energy, Richland Operation Office (RL) to consolidate similar 325 Building activities under the same management within the same Part A (Form 3) and eventually the same Part B permit application.

- Revision 4 of the Part A, Form 3, submitted June 30, 1997, addressed close out of the Notice of Intent (NOI) process that began in 1995 for the HWTUs and gained interim status for the portions of the facility named in Revision 4. Acquisition of interim status by July 29, 1997, was necessary to assure that further extensions or other actions to authorize storage of mixed waste in the HWTUs, specifically tank TK-1, was not needed from the State of Washington Department of Ecology (Ecology). The 45-day NOI comment period was complete July 24, 1997 and per WAC 173-303-281(3)(b), submittal of the revised Form 3 was appropriate at that time. Revision 4 of Form 3, submitted to DOE RL STO on July 24 stated the Revision 4 provided the 325 Building with tank storage capability, which will eliminate that facility's dependency on the 300 Area Radioactive Liquid Waste System for disposal of liquid radioactive or mixed waste. It also provided conforming changes to the quantities and types of waste managed.

- Revision 4A of the Part A, Form 3, dated June 30, 2000, addresses the installation of the Radioactive Liquid Waste Tank (RLWT) system.

| FORM 3 | DANGEROUS WASTE PERMIT APPLICATION | I. EPA/State I.D. No. |
|---|---|---|
| | | W A 7 8 9 0 0 0 8 9 6 7 |

**FOR OFFICIAL USE ONLY**

| Application Approved | Date Received (month/ day / year) | Comments |
|---|---|---|
| | | |

## II. FIRST OR REVISED APPLICATION

*Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application.* If this is your first application and you already know your facility's EPA/STATE I.D. Number, or If this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

**A. First Application** (place an "X" below and provide the appropriate date)

☐ 1. **Existing Facility** (See instructions for *definition of "existing" facility. Complete item below.)*

| MO | DAY | YEAR |
|---|---|---|
| 03 | 22 | 1943 |

*For existing facilities, provide the date (mo/day/yr) operation began or the date construction commenced. (Use the boxes to the left.)

*The date construction of the Hanford Facility commenced

☐ 2. **New Facility** (Complete item below.)

| MO | DAY | YEAR |
|---|---|---|
| | | |

For new facilities, provide the date (mo/day/yr) operation began or is expected to begin

**B. Revised Application** *(Place an "X" below and complete Section I above)*

☒ 1. **Facility has an interim Status Permit**

☒ 2. **Facility has a Final Permit**

## *III. PROCESSES – CODES AND CAPACITIES*

**A. Process Code** – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the codes(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

**B. Process Design Capacity** – For each code entered in column A enter the capacity of the process.

1. Amount – Enter the amount.

2. Unit of Measure – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

| PROCESS | PROCESS CODE | APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY |
|---|---|---|
| STORAGE: | | |
| Container (barrel, drum, etc.) | S01 | Gallons or liters |
| Tank | S02 | Gallons or liters |
| Waste pile | S03 | Cubic yards or cubic meters |
| Surface impoundment | S04 | Gallons or liters |
| DISPOSAL: | | |
| Injection well | D80 | Gallons or liters |
| Landfill | D81 | Acre-feet (the volume that would cover one acre to a Depth of one foot) or hectare-meter |
| Land application | D82 | Acres or hectares |
| Ocean disposal | D83 | Gallons per day or liters per day |
| Surface impoundment | D84 | Gallons or liters |
| TREATMENT: | | |
| Tank | T01 | Gallons per day or liters per day |
| Surface impoundment | T02 | Gallons per day or liters per day |
| Incinerator | T03 | Tons per hour or metric tons per hour; gallons per hour or liters per hour |
| Other (use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or *incinerators. Describe the processes in the space provided; Section III-C.)* | T04 | Gallons per day or liters per day |

| Unit of Measure | Unit of Measure Code | Unit of Measure | Unit of Measure Code | Unit of Measure | Unit of Measure Code |
|---|---|---|---|---|---|
| Gallons | G | Liters Per Day | V | Acre-Feet | A |
| Liters | L | Tons Per Hour | D | Hectare-Meter | F |
| Cubic Yards | Y | Metric Tons Per Hour | W | Acres | B |
| Cubic Meters | C | Gallons Per Hour | E | Hectares | Q |
| Gallons Per Day | U | Liters Per Hour | H | | |

**III. PROCESS – CODES AND DESIGN CAPACITIES** (continued)

**Example for Completing Section III** (shown in line numbers X-1 and X-2 below): A facility has two storage tanks; one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

| Line No. | A. Process Code *(from list above)* | | | B. process Design Capacity<br>1. Amount *(Specify)* | B. process Design Capacity<br>2. Unit of Measure *(enter code)* | | | For Official Use Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| X-1 | S | 0 | 2 | 600 | | G | | | | | |
| X-2 | T | 0 | 3 | 20 | | E | | | | | |
| 1 | S | 0 | 1 | 10,000 | | L | | | | | |
| 2 | T | 0 | 4 | 1,514 | | V | | | | | |
| 3 | S | 0 | 2 | 12,574 | | L | | | | | |
| 4 | T | 0 | 1 | 12,574 | | V | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

**C. Space for additional process codes or for describing other process (code "T04"). For each process entered here include design capacity.**

S01, T04, S02, T01

The 325 Hazardous Waste Treatment Units (325 HWTUs) consist of the Shielded Analytical Laboratory (SAL) which includes Rooms 32, 200, 201, 202, and 203; the Hazardous Waste Treatment Unit (HWTU) encompassing Rooms 520 and 528 of the 325 Building, and the 325 Radioactive Liquid Waste Tank (RLWT) located in the southeast corner of the basement of the 325 Building. The 325 HWTUs began waste management operations in 1991 (SAL) and 1995 (HWTU). Up to 10,000 liters of dangerous and/or mixed waste may be stored in containers in the 325 HWTUs (S01). A maximum of 1514 liters of dangerous and/or mixed waste may be treated per day in containers in the 325 HWTUs (T04).

Liquid dangerous and/or mixed waste is transferred to tank storage via gravity drain lines located in the SAL (which drain into tank TK-1) and in Room 528 [which drain directly to the radioactive liquid waste system (RLWS)]. Tank TK-1 is drained via a jet system into the RLWS then to the RLWT and is used to collect liquid dangerous and/or mixed waste. The RLWT transfers collected liquid dangerous and/or mixed waste to a loadout station, where mobile containers are loaded to transfer the liquid dangerous and/or mixed waste to the Double-Shell Tank System. A maximum of 12,574 liters of dangerous and/or mixed waste may be stored in tanks in the 325 HWTUs (S02). A maximum of 12,574 liters of dangerous and/or mixed waste may be treated in tanks per day in the 325 HWTUs (T01).

Dangerous and/or mixed waste treatments are generally conducted as small bench-scale operations except for in-tank treatments. Treatment processes utilized at the 325 HWTUs may include the following:

T11 Molten salt destructor
T12 Pyrolysis
T13 Wet air oxidation
T14 Calcination
T15 Microwave discharge
T18 Other thermal treatment
T21 Chemical fixation
T22 Chemical oxidation
T23 Chemical precipitation
T24 Chemical reduction
T25 Chlorination
T26 Chlorinolysis
T27 Cyanide destruction
T28 Degradation
T29 Detoxification
T30 Ion exchange
T31 Neutralization
T32 Ozonation
T33 Photolysis
T34 Other chemical treatment
T35 Centrifugation
T36 Clarification
T37 Coagulation
T38 Decanting
T39 Encapsulation
T40 Filtration
T41 Flocculation
T42 Flotation
T43 Foaming
T44 Sedimentation
T45 Thickening
T46 Ultrafiltration
T47 Other separation technology
T48 Absorption-molecular sieve
T49 Activated carbon
T50 Blending
T51 Catalysis
T52 Crystallization
T53 Dialysis
T54 Distillation
T55 Electrodialysis
T56 Electrolysis
T57 Evaporation
T58 High gradient magnetic separation
T59 Leaching
T60 Liquid ion exchange
T61 Liquid-liquid extraction
T62 Reverse osmosis
T63 Solvent recovery
T64 Stripping
T65 Sand filter
T66 Other removal technology
T67 Activated sludge
T69 Aerobic tank
T70 Anaerobic lagoon or tank
T71 Composting
T74 Thickening filter
T75 Trickling filter
T77 Other biological treatment

## IV. DESCRIPTION OF DANGEROUS WASTES

**A. Dangerous Waste Number** – Enter the digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four-digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

**B. Estimated Annual Quantity** - For each listed waste entered in column A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

**C. Unit of Measure** - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate odes are:

| ENGLISH UNIT OF MEASURE | CODE | METRIC UNIT OF MEASURE | CODE |
|---|---|---|---|
| Pounds | P | Kilograms | K |
| Tons | T | Metric Tons | M |

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

**D. Processes**

1. Process Codes:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. Process Description: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

Example for completing Section IV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste.

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes 1. Process Codes *(enter)* | | | | D. Processes 2. Process Description *(if a code is not entered in D(1))* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X-1 | K | 0 | 5 | 4 | 900 | | P | | T03 | D80 | | | |
| X-2 | D | 0 | 0 | 2 | 400 | | P | | T03 | D80 | | | |
| X-3 | D | 0 | 0 | 1 | 100 | | P | | T03 | D80 | | | |
| X-4 | D | 0 | 0 | 2 | | | | | T03 | D80 | | | *Included with above* |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | |
|---|---|
| W A 7 8 9 0 0 0 8 9 6 7 | |
| | |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(If a code is not entered in D(1))* |
| 1 | D | 0 | 0 | 1 | 82,500*<br>*[60,000 (S01); 22,500 (T04)] | K | | | S01 | T04 | | | Storage-Container/Treatment-Other |
| 2 | D | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 3 | D | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 4 | D | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 5 | D | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 6 | D | 0 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 7 | D | 0 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 8 | D | 0 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 9 | D | 0 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 10 | D | 0 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 11 | D | 0 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 12 | D | 0 | 1 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 13 | D | 0 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 14 | D | 0 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 15 | D | 0 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 16 | D | 0 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 17 | D | 0 | 1 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 18 | D | 0 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 19 | D | 0 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 20 | D | 0 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 21 | D | 0 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 22 | D | 0 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 23 | D | 0 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 24 | D | 0 | 2 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 25 | D | 0 | 2 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 26 | D | 0 | 2 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 27 | D | 0 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 28 | D | 0 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 29 | D | 0 | 2 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 30 | D | 0 | 3 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 31 | D | 0 | 3 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 32 | D | 0 | 3 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 33 | D | 0 | 3 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 34 | D | 0 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 35 | D | 0 | 3 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 36 | D | 0 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 37 | D | 0 | 3 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 38 | D | 0 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 39 | D | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 40 | D | 0 | 4 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 41 | D | 0 | 4 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 42 | D | 0 | 4 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 43 | D | 0 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 44 | F | 0 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 45 | F | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | |
|---|---|
| W A 7 8 9 0 0 0 8 9 6 7 | |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 46 | F | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 47 | F | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 48 | F | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 49 | F | 0 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 50 | F | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 51 | K | 0 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 52 | K | 0 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 53 | K | 0 | 4 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 54 | K | 0 | 4 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 55 | K | 0 | 5 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 56 | K | 0 | 5 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 57 | K | 0 | 5 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 58 | P | 0 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 59 | P | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 60 | P | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 61 | P | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 62 | P | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 63 | P | 0 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 64 | P | 0 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 65 | P | 0 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 66 | P | 0 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 67 | P | 0 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 68 | P | 0 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 69 | P | 0 | 1 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 70 | P | 0 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 71 | P | 0 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 72 | P | 0 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 73 | P | 0 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 74 | P | 0 | 1 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 75 | P | 0 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 76 | P | 0 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 77 | P | 0 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 78 | P | 0 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 79 | P | 0 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 80 | P | 0 | 2 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 81 | P | 0 | 2 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 82 | P | 0 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 83 | P | 0 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 84 | P | 0 | 2 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 85 | P | 0 | 3 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 86 | P | 0 | 3 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 87 | P | 0 | 3 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 88 | P | 0 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 89 | P | 0 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 90 | P | 0 | 3 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 91 | P | 0 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* |
|---|
| W A 7 8 9 0 0 0 8 9 6 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes: 1. Process Codes *(enter)* | | | | D. Processes: 2. Process Description *(If a code is not entered in D(1))* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 92 | P | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 93 | P | 0 | 4 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 94 | P | 0 | 4 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 95 | P | 0 | 4 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 96 | P | 0 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 97 | P | 0 | 4 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 98 | P | 0 | 4 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 99 | P | 0 | 4 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 100 | P | 0 | 4 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 101 | P | 0 | 4 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 102 | P | 0 | 4 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 103 | P | 0 | 5 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 104 | P | 0 | 5 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 105 | P | 0 | 5 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 106 | P | 0 | 5 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 107 | P | 0 | 5 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 108 | P | 0 | 5 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 109 | P | 0 | 5 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 110 | P | 0 | 6 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 111 | P | 0 | 6 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 112 | P | 0 | 6 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 113 | P | 0 | 6 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 114 | P | 0 | 6 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 115 | P | 0 | 6 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 116 | P | 0 | 6 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 117 | P | 0 | 6 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 118 | P | 0 | 6 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 119 | P | 0 | 7 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 120 | P | 0 | 7 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 121 | P | 0 | 7 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 122 | P | 0 | 7 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 123 | P | 0 | 7 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 124 | P | 0 | 7 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 125 | P | 0 | 7 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 126 | P | 0 | 7 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 127 | P | 0 | 7 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 128 | P | 0 | 8 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 129 | P | 0 | 8 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 130 | P | 0 | 8 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 131 | P | 0 | 8 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 132 | P | 0 | 8 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 133 | P | 0 | 8 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 134 | P | 0 | 8 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 135 | P | 0 | 9 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 136 | P | 0 | 9 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 137 | P | 0 | 9 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 | |

**IV. DESCRIPTION OF DANGEROUS WASTES *(continued)***

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes 1. Process Codes *(enter)* | | | | D. Processes 2. Process Description *(if a code is not entered in D(1))* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 138 | P | 0 | 9 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 139 | P | 0 | 9 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 140 | P | 0 | 9 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 141 | P | 0 | 9 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 142 | P | 0 | 9 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 143 | P | 1 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 144 | P | 1 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 145 | P | 1 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 146 | P | 1 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 147 | P | 1 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 148 | P | 1 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 149 | P | 1 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 150 | P | 1 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 151 | P | 1 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 152 | P | 1 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 153 | P | 1 | 1 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 154 | P | 1 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 155 | P | 1 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 156 | P | 1 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 157 | P | 1 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 158 | P | 1 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 159 | P | 1 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 160 | P | 1 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 161 | P | 1 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 162 | P | 1 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 163 | P | 1 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 164 | P | 1 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 165 | P | 1 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 166 | P | 1 | 8 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 167 | P | 1 | 8 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 168 | P | 1 | 8 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 169 | P | 1 | 9 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 170 | P | 1 | 9 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 171 | P | 1 | 9 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 172 | P | 1 | 9 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 173 | P | 1 | 9 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 174 | P | 1 | 9 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 175 | P | 1 | 9 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 176 | P | 2 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 177 | P | 2 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 178 | P | 2 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 179 | P | 2 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 180 | P | 2 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 181 | U | 0 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 182 | U | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 183 | U | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 184 | U | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 185 | U | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 186 | U | 0 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 187 | U | 0 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 188 | U | 0 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 189 | U | 0 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 190 | U | 0 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 191 | U | 0 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 192 | U | 0 | 1 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 193 | U | 0 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 194 | U | 0 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 195 | U | 0 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 196 | U | 0 | 1 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 197 | U | 0 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 198 | U | 0 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 199 | U | 0 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 200 | U | 0 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 201 | U | 0 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 202 | U | 0 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 203 | U | 0 | 2 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 204 | U | 0 | 2 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 205 | U | 0 | 2 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 206 | U | 0 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 207 | U | 0 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 208 | U | 0 | 2 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 209 | U | 0 | 3 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 210 | U | 0 | 3 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 211 | U | 0 | 3 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 212 | U | 0 | 3 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 213 | U | 0 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 214 | U | 0 | 3 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 215 | U | 0 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 216 | U | 0 | 3 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 217 | U | 0 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 218 | U | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 219 | U | 0 | 4 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 220 | U | 0 | 4 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 221 | U | 0 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 222 | U | 0 | 4 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 223 | U | 0 | 4 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 224 | U | 0 | 4 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 225 | U | 0 | 4 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 226 | U | 0 | 4 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 227 | U | 0 | 4 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 228 | U | 0 | 5 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 229 | U | 0 | 5 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(If a code is not entered in D(1))* |
| 230 | U | 0 | 5 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 231 | U | 0 | 5 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 232 | U | 0 | 5 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 233 | U | 0 | 5 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 234 | U | 0 | 5 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 235 | U | 0 | 5 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 236 | U | 0 | 5 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 237 | U | 0 | 6 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 238 | U | 0 | 6 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 239 | U | 0 | 6 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 240 | U | 0 | 6 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 241 | U | 0 | 6 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 242 | U | 0 | 6 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 243 | U | 0 | 6 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 244 | U | 0 | 6 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 245 | U | 0 | 6 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 246 | U | 0 | 7 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 247 | U | 0 | 7 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 248 | U | 0 | 7 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 249 | U | 0 | 7 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 250 | U | 0 | 7 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 251 | U | 0 | 7 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 252 | U | 0 | 7 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 253 | U | 0 | 7 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 254 | U | 0 | 7 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 255 | U | 0 | 7 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 256 | U | 0 | 8 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 257 | U | 0 | 8 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 258 | U | 0 | 8 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 259 | U | 0 | 8 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 260 | U | 0 | 8 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 261 | U | 0 | 8 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 262 | U | 0 | 8 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 263 | U | 0 | 8 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 264 | U | 0 | 8 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 265 | U | 0 | 8 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 266 | U | 0 | 9 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 267 | U | 0 | 9 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 268 | U | 0 | 9 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 269 | U | 0 | 9 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 270 | U | 0 | 9 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 271 | U | 0 | 9 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 272 | U | 0 | 9 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 273 | U | 0 | 9 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 274 | U | 0 | 9 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 275 | U | 0 | 9 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes 1. Process Codes *(enter)* | | | | D. Processes 2. Process Description *(if a code is not entered in D(1))* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 276 | U | 1 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 277 | U | 1 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 278 | U | 1 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 279 | U | 1 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 280 | U | 1 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 281 | U | 1 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 282 | U | 1 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 283 | U | 1 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 284 | U | 1 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 285 | U | 1 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 286 | U | 1 | 1 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 287 | U | 1 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 288 | U | 1 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 289 | U | 1 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 290 | U | 1 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 291 | U | 1 | 1 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 292 | U | 1 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 293 | U | 1 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 294 | U | 1 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 295 | U | 1 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 296 | U | 1 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 297 | U | 1 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 298 | U | 1 | 2 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 299 | U | 1 | 2 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 300 | U | 1 | 2 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 301 | U | 1 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 302 | U | 1 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 303 | U | 1 | 2 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 304 | U | 1 | 3 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 305 | U | 1 | 3 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 306 | U | 1 | 3 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 307 | U | 1 | 3 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 308 | U | 1 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 309 | U | 1 | 3 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 310 | U | 1 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 311 | U | 1 | 3 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 312 | U | 1 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 313 | U | 1 | 4 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 314 | U | 1 | 4 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 315 | U | 1 | 4 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 316 | U | 1 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 317 | U | 1 | 4 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 318 | U | 1 | 4 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 319 | U | 1 | 4 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 320 | U | 1 | 4 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 321 | U | 1 | 4 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 322 | U | 1 | 4 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 323 | U | 1 | 5 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 324 | U | 1 | 5 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 325 | U | 1 | 5 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 326 | U | 1 | 5 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 327 | U | 1 | 5 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 328 | U | 1 | 5 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 329 | U | 1 | 5 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 330 | U | 1 | 5 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 331 | U | 1 | 5 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 332 | U | 1 | 5 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 333 | U | 1 | 6 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 334 | U | 1 | 6 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 335 | U | 1 | 6 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 336 | U | 1 | 6 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 337 | U | 1 | 6 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 338 | U | 1 | 6 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 339 | U | 1 | 6 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 340 | U | 1 | 6 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 341 | U | 1 | 6 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 342 | U | 1 | 6 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 343 | U | 1 | 7 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 344 | U | 1 | 7 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 345 | U | 1 | 7 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 346 | U | 1 | 7 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 347 | U | 1 | 7 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 348 | U | 1 | 7 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 349 | U | 1 | 7 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 350 | U | 1 | 7 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 351 | U | 1 | 7 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 352 | U | 1 | 8 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 353 | U | 1 | 8 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 354 | U | 1 | 8 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 355 | U | 1 | 8 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 356 | U | 1 | 8 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 357 | U | 1 | 8 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 358 | U | 1 | 8 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 359 | U | 1 | 8 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 360 | U | 1 | 8 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 361 | U | 1 | 8 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 362 | U | 1 | 9 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 363 | U | 1 | 9 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 364 | U | 1 | 9 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 365 | U | 1 | 9 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 366 | U | 1 | 9 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 367 | U | 1 | 9 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |

*Photocopy this page before completing if you have more than 26 wastes to list.*

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 368 | U | 1 | 9 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 369 | U | 2 | 0 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 370 | U | 2 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 371 | U | 2 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 372 | U | 2 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 373 | U | 2 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 374 | U | 2 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 375 | U | 2 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 376 | U | 2 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 377 | U | 2 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 378 | U | 2 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 379 | U | 2 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 380 | U | 2 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 381 | U | 2 | 1 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 382 | U | 2 | 1 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 383 | U | 2 | 1 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 384 | U | 2 | 1 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 385 | U | 2 | 1 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 386 | U | 2 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 387 | U | 2 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 388 | U | 2 | 2 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 389 | U | 2 | 2 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 390 | U | 2 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 391 | U | 2 | 2 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 392 | U | 2 | 2 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 393 | U | 2 | 2 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 394 | U | 2 | 2 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 395 | U | 2 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 396 | U | 2 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 397 | U | 2 | 3 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 398 | U | 2 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 399 | U | 2 | 3 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 400 | U | 2 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 401 | U | 2 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 402 | U | 2 | 4 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 403 | U | 2 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 404 | U | 2 | 4 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 405 | U | 2 | 4 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 406 | U | 2 | 4 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 407 | U | 2 | 4 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 408 | U | 2 | 4 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 409 | U | 2 | 7 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 410 | U | 2 | 7 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 411 | U | 2 | 7 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 412 | U | 2 | 7 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 413 | U | 2 | 8 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | |
|---|---|
| W A 7 8 9 0 0 0 8 9 6 7 | |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1. Process Codes *(enter)* | | | | 2. Process Description *(if a code is not entered in D(1))* |
| 414 | U | 3 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 415 | U | 3 | 5 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 416 | U | 3 | 5 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 417 | U | 3 | 6 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 418 | U | 3 | 6 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 419 | U | 3 | 6 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 420 | U | 3 | 6 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 421 | U | 3 | 7 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 422 | U | 3 | 7 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 423 | U | 3 | 7 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 424 | U | 3 | 7 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 425 | U | 3 | 7 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 426 | U | 3 | 7 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 427 | U | 3 | 7 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 428 | U | 3 | 8 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 429 | U | 3 | 8 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 430 | U | 3 | 8 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 431 | U | 3 | 8 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 432 | U | 3 | 8 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 433 | U | 3 | 8 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 434 | U | 3 | 8 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 435 | U | 3 | 8 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 436 | U | 3 | 9 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 437 | U | 3 | 9 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 438 | U | 3 | 9 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 439 | U | 3 | 9 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 440 | U | 3 | 9 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 441 | U | 3 | 9 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 442 | U | 3 | 9 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 443 | U | 4 | 0 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 444 | U | 4 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 445 | U | 4 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 446 | U | 4 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 447 | U | 4 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 448 | U | 4 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 449 | U | 4 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 450 | U | 4 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 451 | U | 4 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 452 | W | T | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 453 | W | T | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 454 | W | P | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 455 | W | P | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 456 | W | P | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 457 | W | S | C | 2 | | ↓ | | | ↓ | ↓ | | | Included with above |

Photocopy this page before completing if you have more than 26 wastes to list.

| I.D. Number *(enter from page 1)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | A | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 6 | 7 |

## IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

| Line No. | A. Dangerous Waste No. *(enter code)* | | | | B. Estimated Annual Quantity of Waste | C. Unit of Measure *(enter code)* | | | D. Processes 1. Process Codes *(enter)* | | | | D. Processes 2. Process Description *(if a code is not entered in D(1))* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 458 | D | 0 | 0 | 1 | 80,000 | K | | | S02 | T01 | | | Storage-Tank/Treatment-Tank |
| 459 | D | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 460 | D | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 461 | D | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 462 | D | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 463 | D | 0 | 0 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 464 | D | 0 | 0 | 7 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 465 | D | 0 | 0 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 466 | D | 0 | 0 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 467 | D | 0 | 1 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 468 | D | 0 | 1 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 469 | D | 0 | 1 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 470 | D | 0 | 1 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 471 | D | 0 | 2 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 472 | D | 0 | 2 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 473 | D | 0 | 2 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 474 | D | 0 | 3 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 475 | D | 0 | 3 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 476 | D | 0 | 3 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 477 | D | 0 | 3 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 478 | D | 0 | 3 | 6 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 479 | D | 0 | 3 | 8 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 480 | D | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 481 | D | 0 | 4 | 0 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 482 | D | 0 | 4 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 483 | D | 0 | 4 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 484 | W | T | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 485 | W | T | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 486 | W | P | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 487 | W | P | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 488 | W | S | C | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 489 | F | 0 | 0 | 1 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 490 | F | 0 | 0 | 2 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 491 | F | 0 | 0 | 3 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 492 | F | 0 | 0 | 4 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 493 | F | 0 | 0 | 5 | | ↓ | | | ↓ | ↓ | | | ↓ |
| 494 | F | 0 | 3 | 9 | | ↓ | | | ↓ | ↓ | | | Included with above |

**IV. DESCRIPTION OF DANGEROUS WASTE (continued)**

**E. Use this space to list additional process codes from Section D(1) on page 3.**

Routine dangerous and/or mixed waste treatment that will be conducted in the 325 HWTUs will include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, waste concentration by evaporation, precipitation, filtration, solvent extraction, solids washing, phase separation, catalytic destruction, and solidification/stabilization. These waste treatments will be conducted on small quantities of diverse radioactive, dangerous and/or mixed wastes generated from ongoing research and development and analytical chemistry activities. Waste to be handled in the 325 HWTUs will include listed waste, waste from non-specific sources, characteristic waste, and state-only criteria waste. Multi-source leachate (F039) is included as a waste derived from non-specific source waste F001 through F005.

**V. FACILIITY DRAWING** Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

**VI. PHOTOGRAPHS** Refer to attached photograph(s).

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment *and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).*

**VII. FACILITY GEOGRAPHIC LOCATION** This information is provided on the attached drawings and photos.

| LATITUDE *(degrees, minutes, & seconds)* | LONGITUDE *(degrees, minutes, & seconds)* |
|---|---|
| | |

**VIII. FACILITY OWNER**

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information," place an "X" in the box to the left and skip to Section XI below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

| 1. Name of Facility's Legal Owner | 2. Phone Number *(area code & no.)* |
|---|---|
| | |

| 3. Street or P.O. Box | 4. City or Town | 5. St. | 6. Zip Code |
|---|---|---|---|
| | | | |

**IX. OWNER CERTIFICATION**

*I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.*

| Name *(print or type)* | Signature | Date Signed |
|---|---|---|
| Lloyd L. Piper, Acting Manager<br>U.S. Department of Energy<br>Richland Operations Office | L.L/ Piper | Revision 4 signed<br>06/30/1997 |

**X. OPERATOR CERTIFICATION**

*I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.*

| Name *(Print Or Type)* | Signature | Date Signed |
|---|---|---|
| See attachment | | |

X. OPERATOR CERTIFICATION

**I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.**

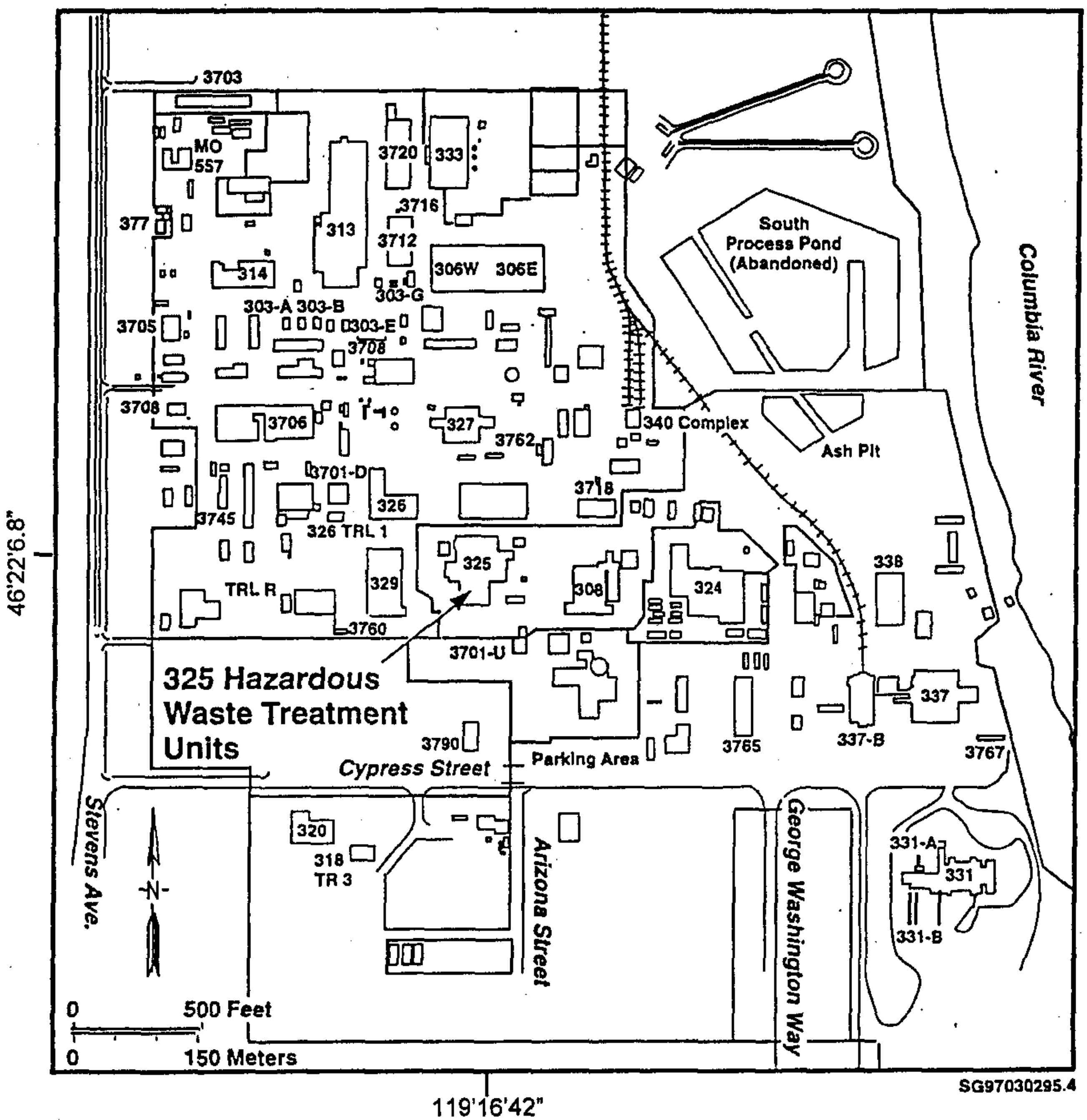
L. L. Piper
Owner/Operator
Lloyd L. Piper, Acting Manager
U.S. Department of Energy
Richland Operations Office

6/30/97
Date Revision 4 Signed

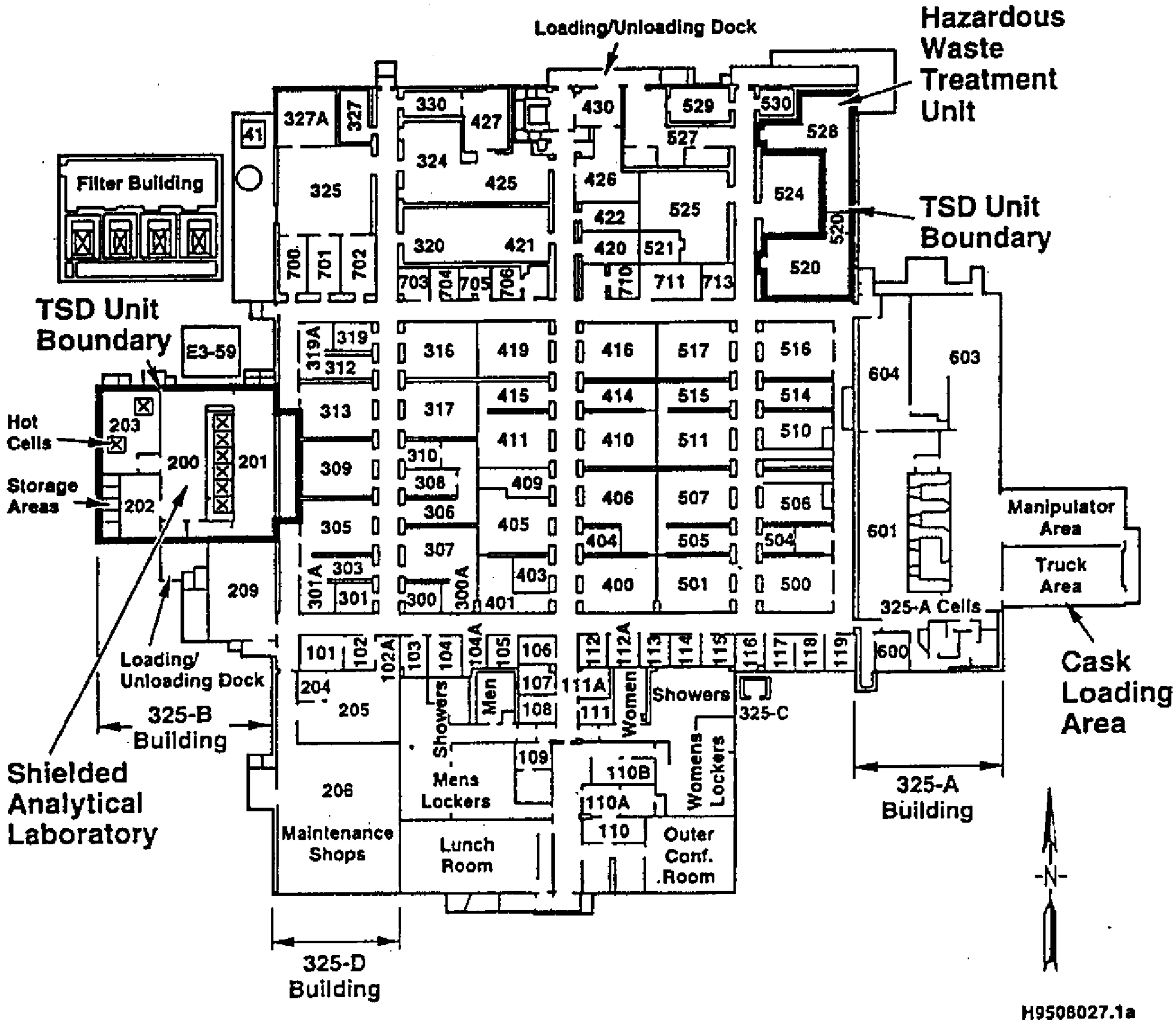
William J. Madia
Co-Operator
William J. Madia, Director
Pacific Northwest national Laboratory

6/26/97
Date Revision 4 Signed

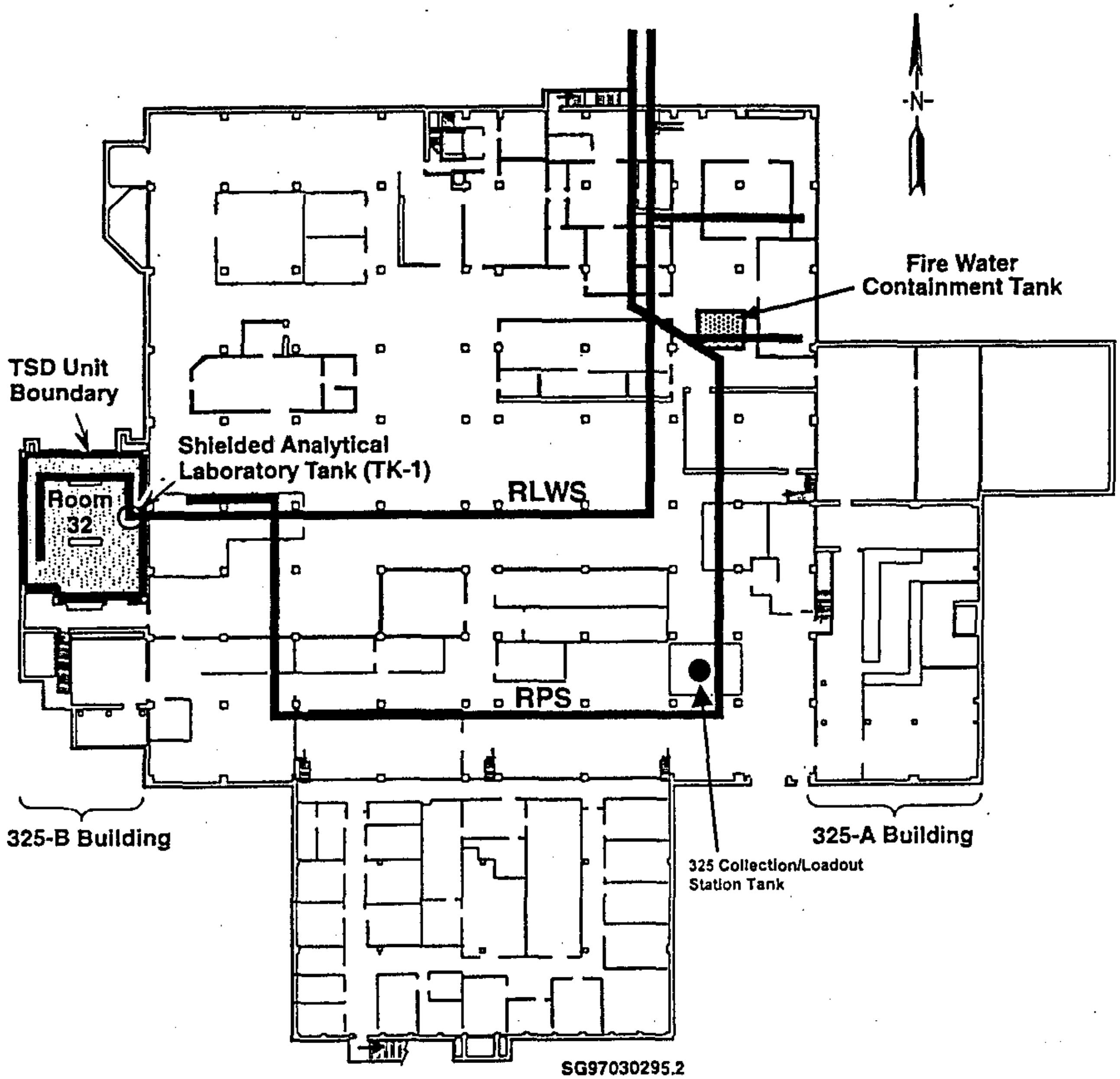
**Location of the 325 Hazardous Waste Treatment Units in the 300 Area.**



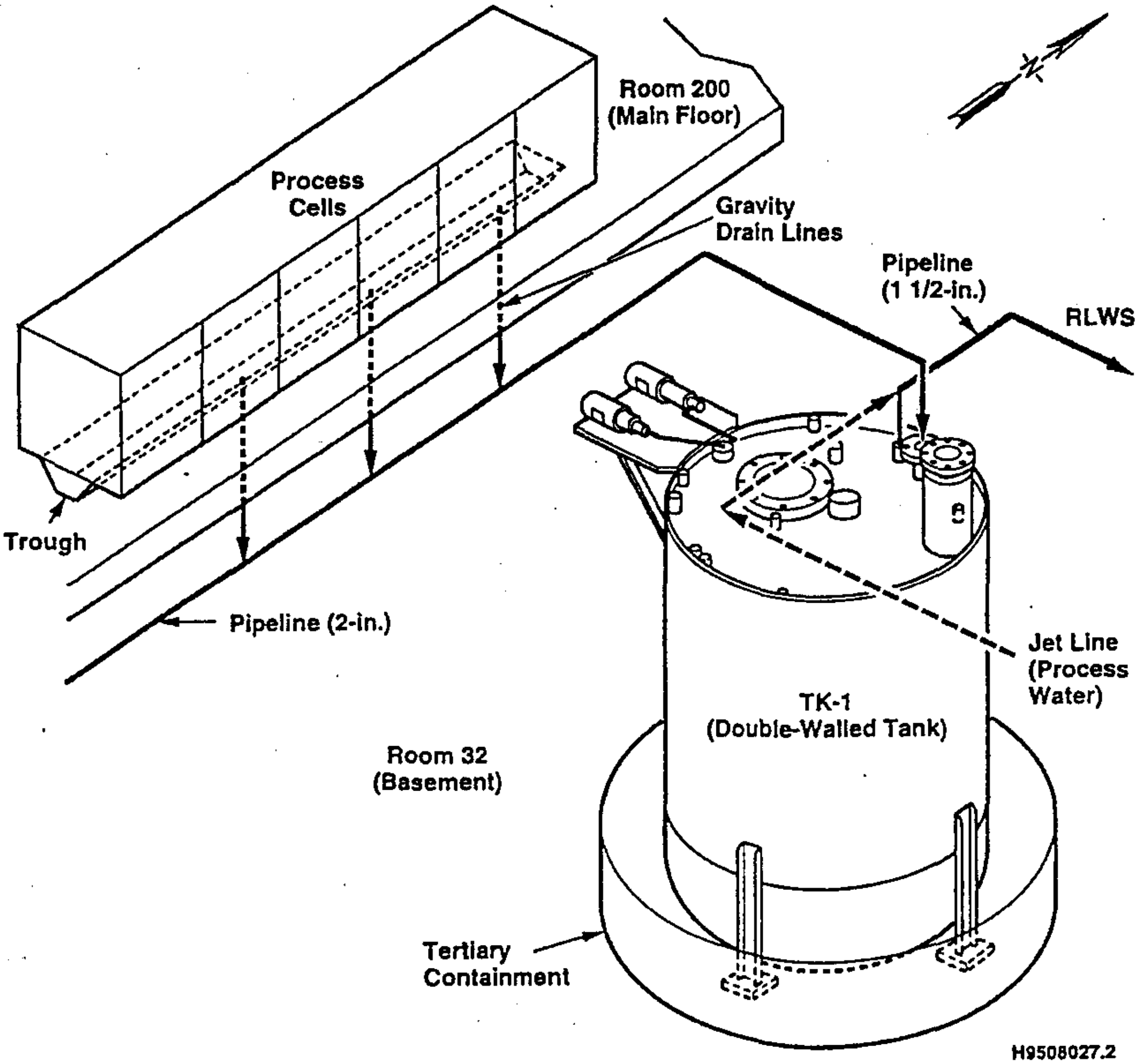
**Location of the Hazardous Waste Treatment Unit and Shielded Analytical Laboratory (main floor).**



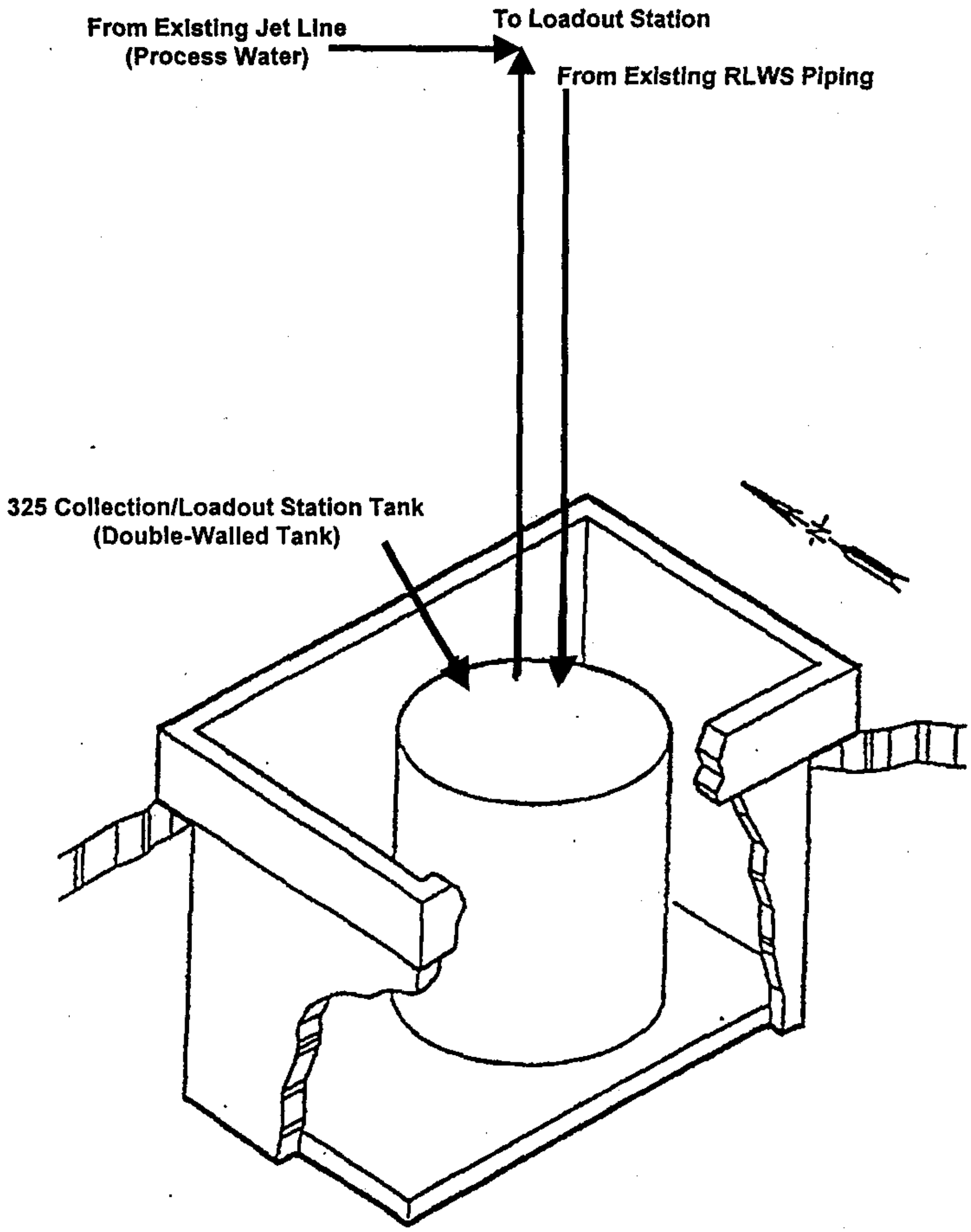
**Location of Shielded Analytical Laboratory Tank in Room 32 and Location of 325 Collection/Loadout Station Tank (basement) of the 325 Building**



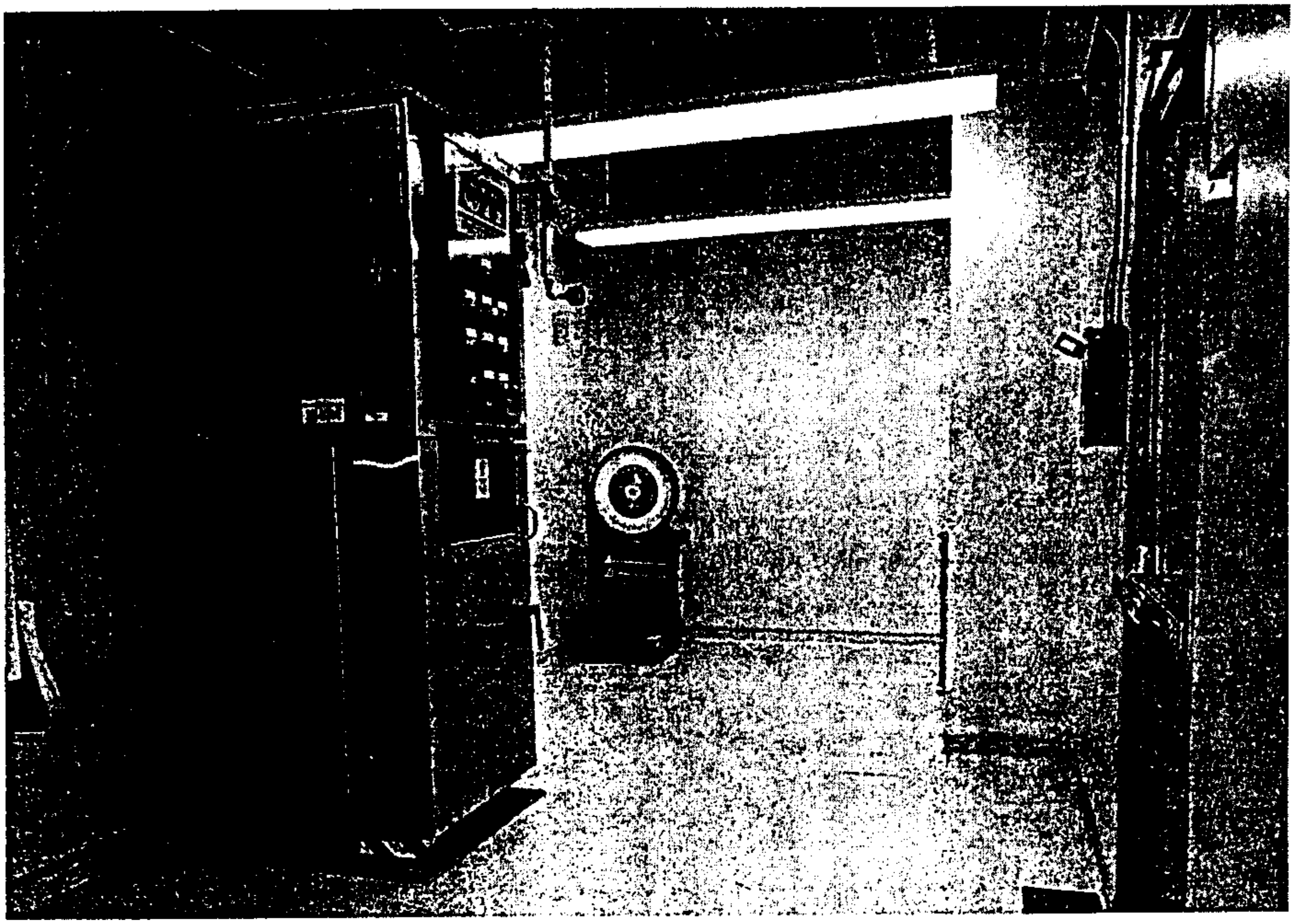
**Shielded Analytical Laboratory Tank and Ancillary Piping.**



**325 Collection/Loadout Station Tank**



# 325 Hazardous Waste Treatment Units

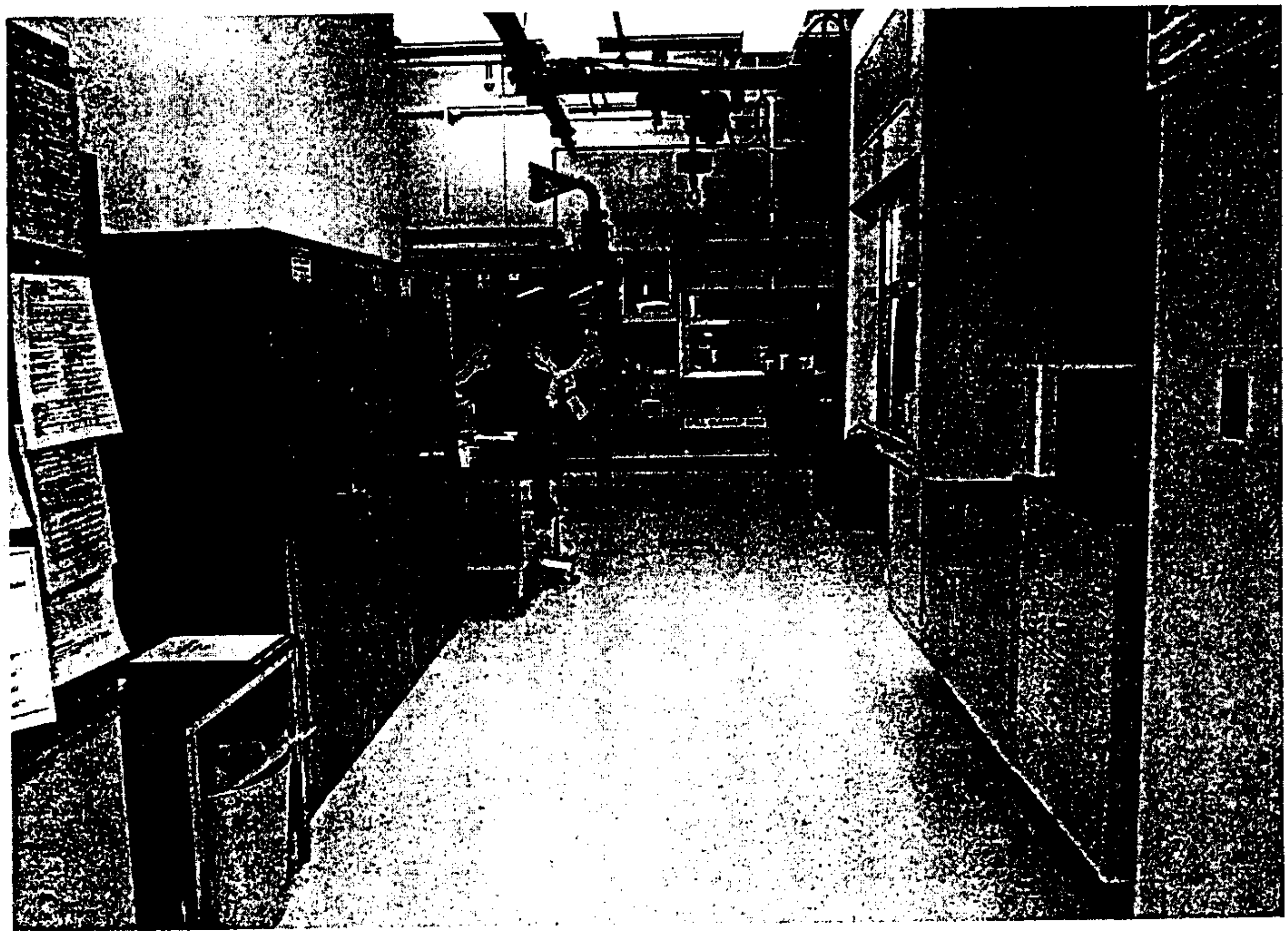


**325 Hazardous Waste Treatment Units**
**Room 528**

**46°22'6.8"**
**119°16'42"**

96010398-22CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units

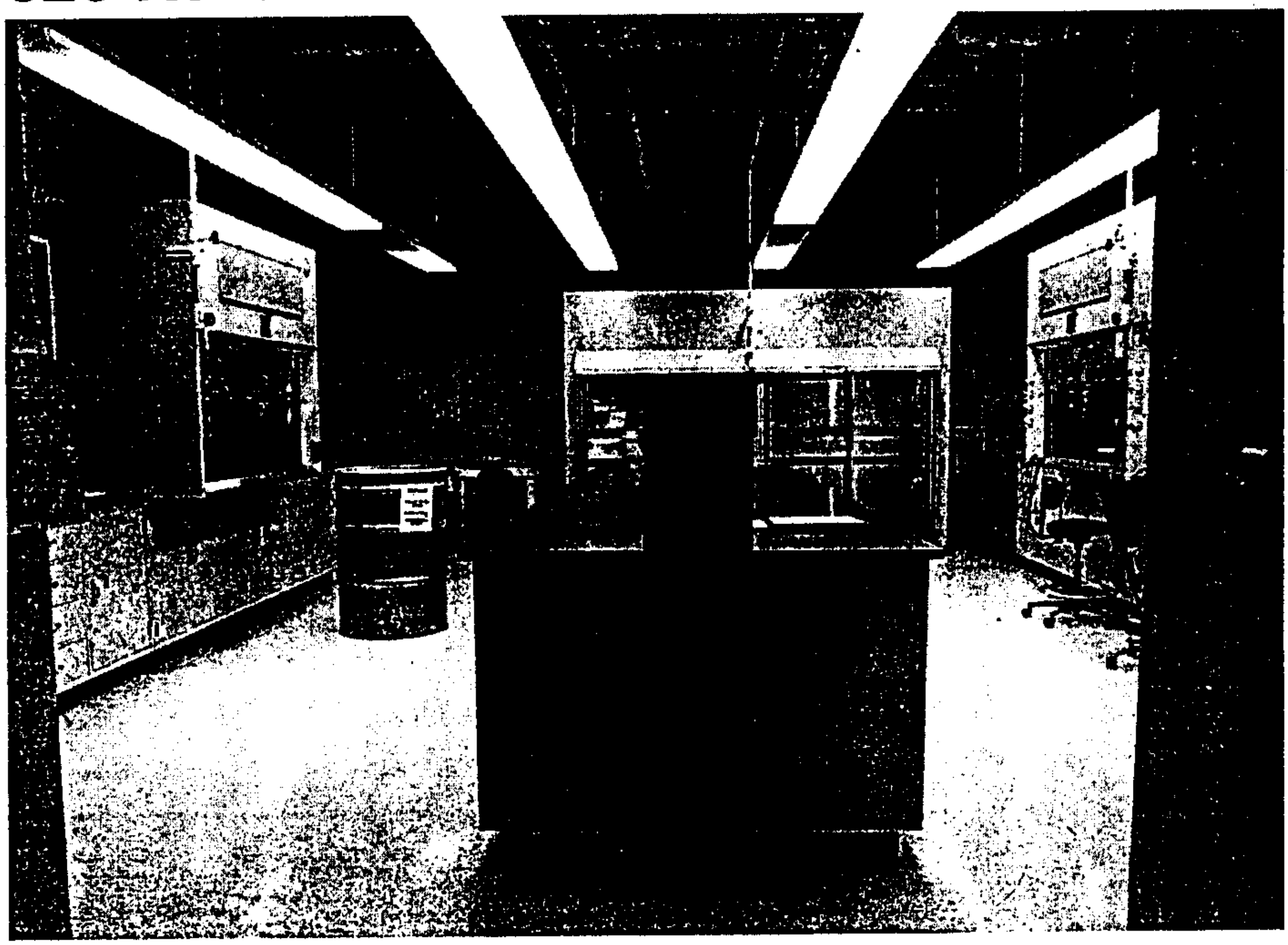


**325 Hazardous Waste Treatment Units**
**Room 528**

**46°22'6.8"**
**119°16'42"**

96010398-20CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units

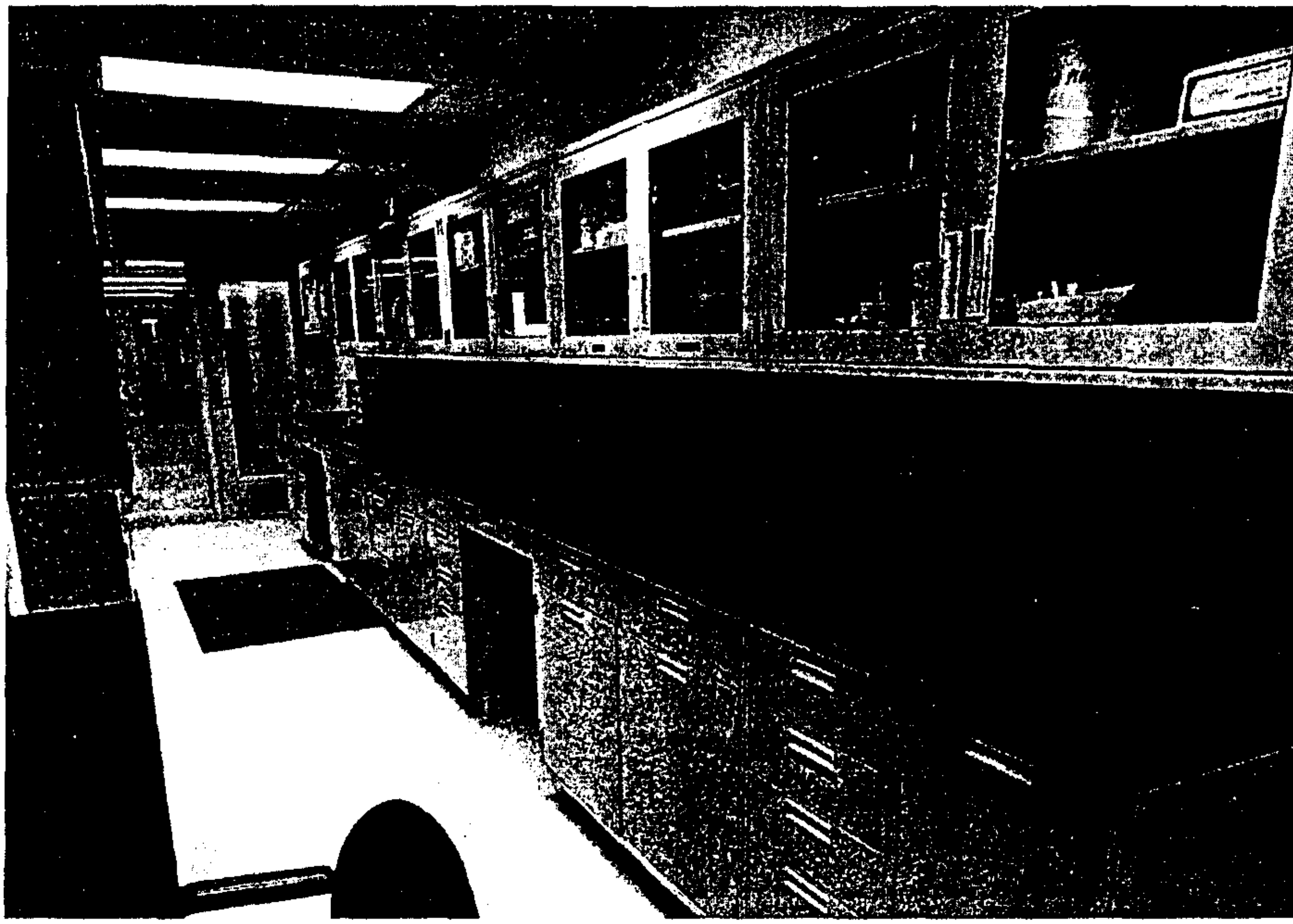


**325 Hazardous Waste Treatment Units**
**Room 520**

**46°22'6.8"**
**119°16'42"**

96010398-17CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units

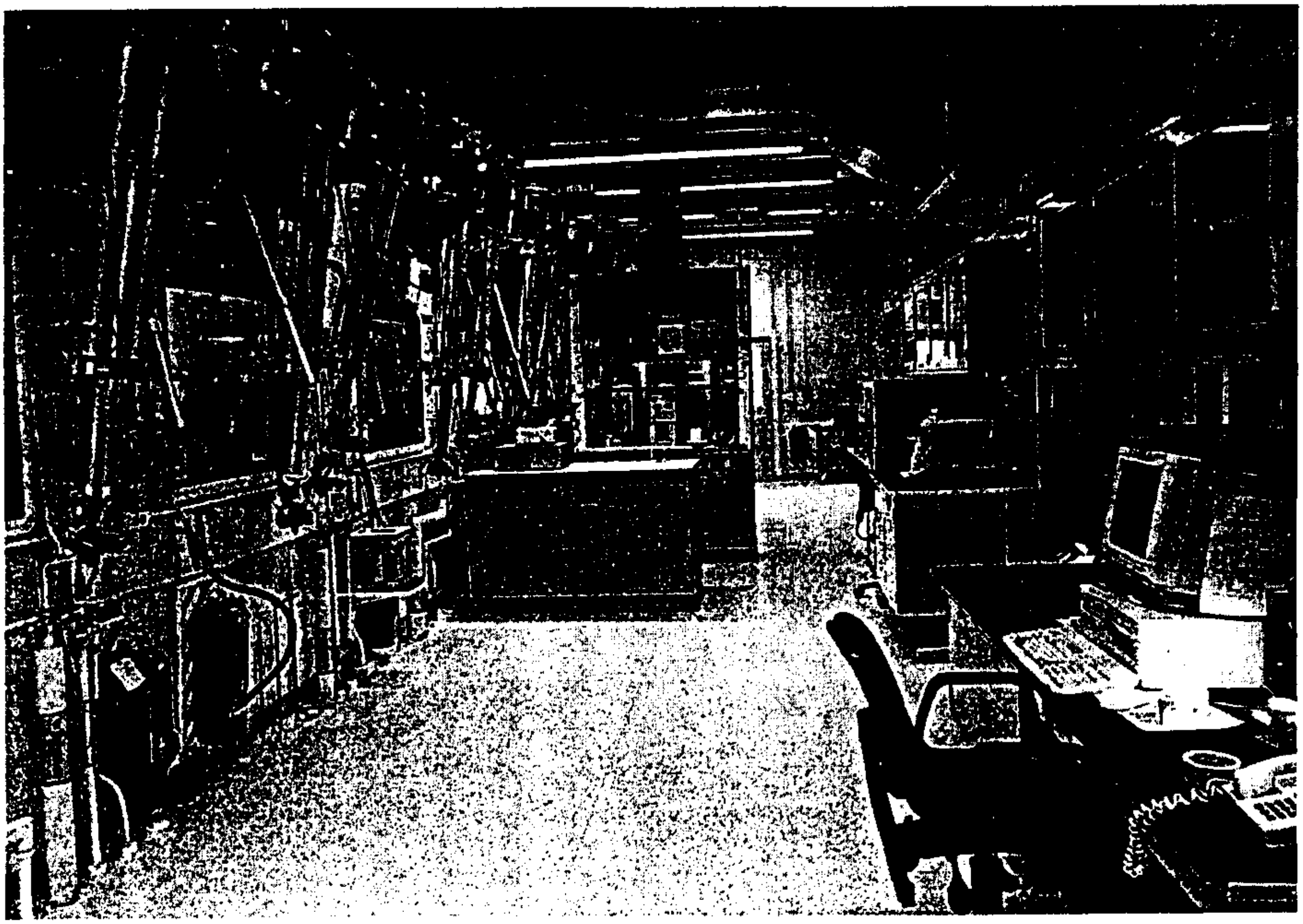


Shielded Analytical Laboratory
Room 201

46°22'6.8"
119°16'42"

96010398-16CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units



**Shielded Analytical Laboratory**
**Room 201**

**46°22'6.8"**
**119°16'42"**

96010398-7CN
(Photo Taken 1996)

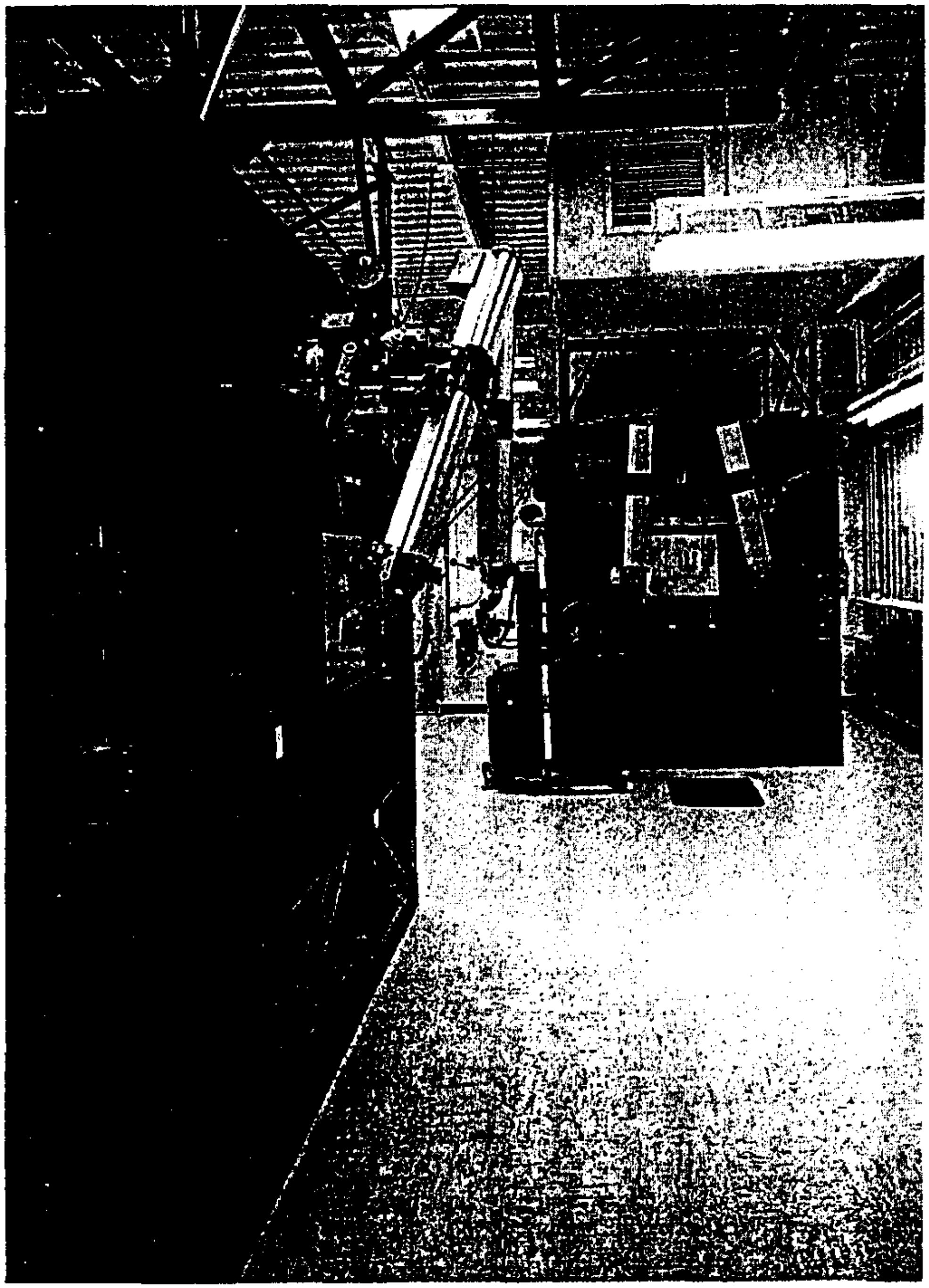
# 325 Hazardous Waste Treatment Units

**Shielded Analytical Laboratory**
**Room 200**

**46°22'6.8"**
**119°16'42"**

96010398-1CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units

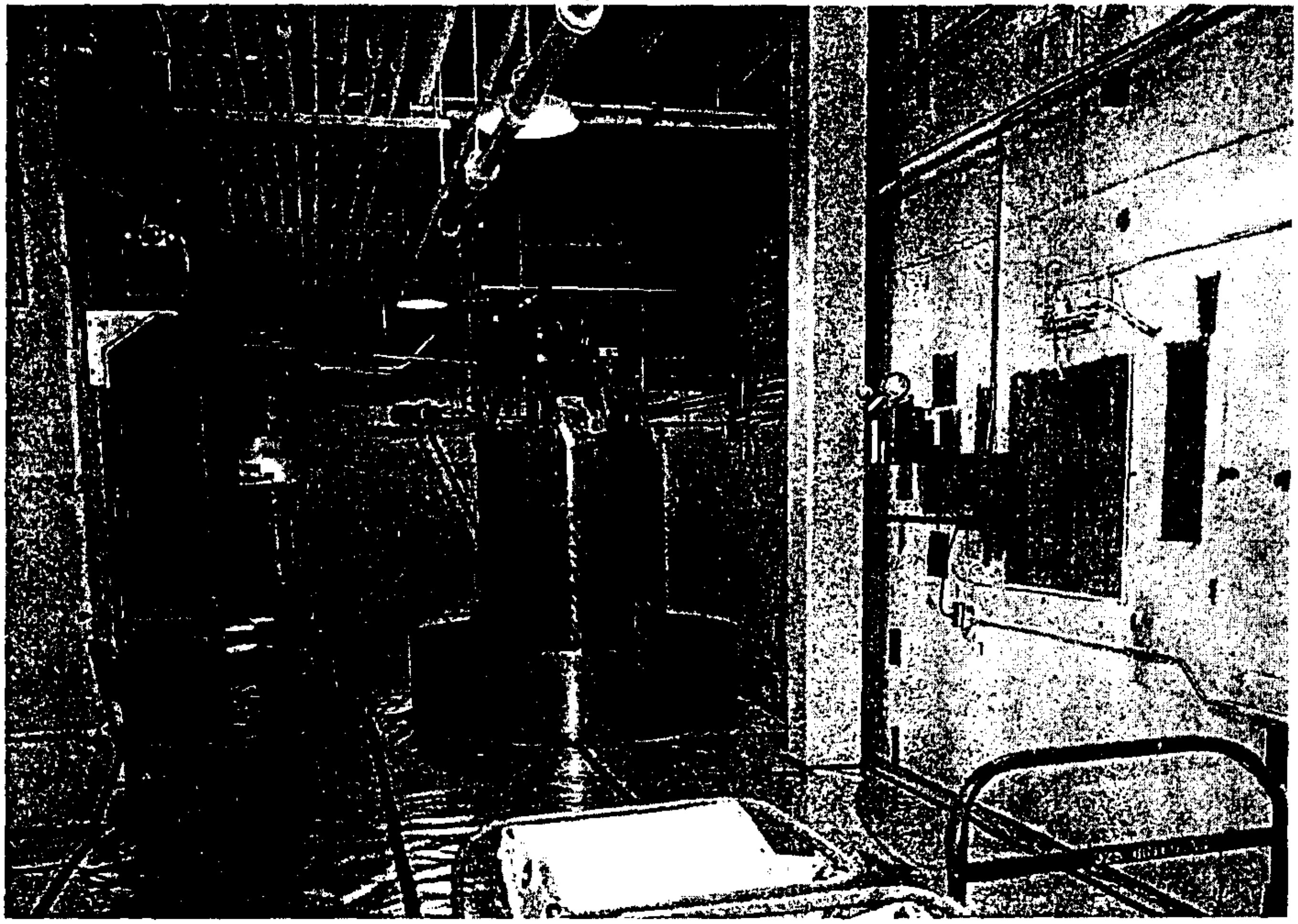


**Shielded Analytical Laboratory**
**Room 203**

**46°22'6.8"**
**119°16'42"**

7908247-1CN
(Photo Taken 1979)

# 325 Hazardous Waste Treatment Units

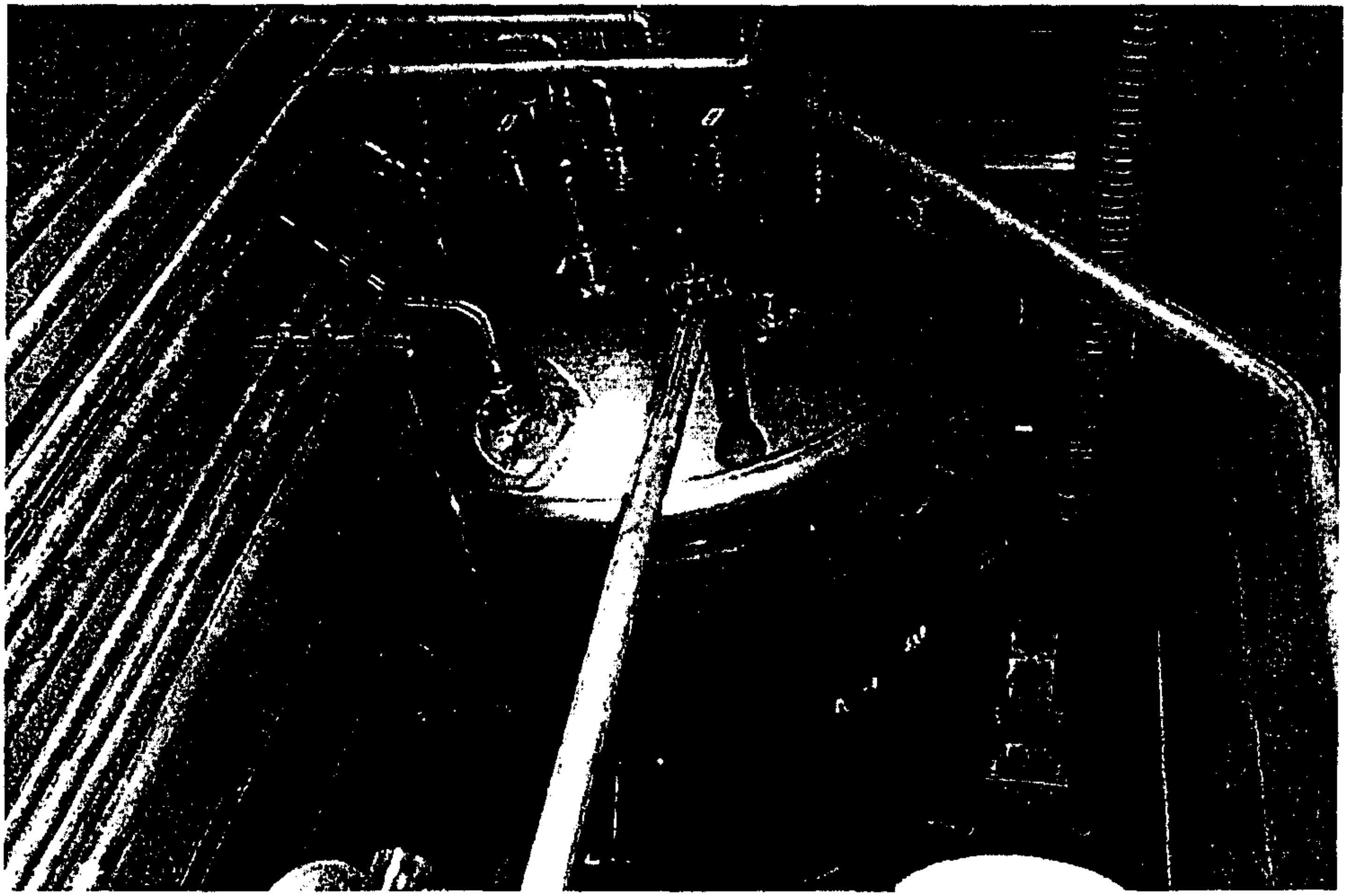


**Shielded Analytical Laboratory**
**SAL Tank**

**46°22'6.8"**
**119°16'42"**

96010398-3CN
(Photo Taken 1996)

# 325 Hazardous Waste Treatment Units



***325 Collection/Loadout Station Tank***

**46°22'6.8"**
**119°16'42"**

(Photo Taken 1999)

# 2.0 CONTENTS



## FIGURES



## APPENDIX

# 2.0 FACILITY DESCRIPTION AND GENERAL PROVISIONS

The 325 Building, Radiochemical Processing Laboratory (RPL) Building includes the following: (1) a central portion (completed in 1953) that consists of three floors (basement, ground, and second) containing general purpose laboratories, provided with special ventilation and work enclosures, designed for radiochemical work; (2) a south (front) wing containing office space, locker rooms, and a lunch room; and (3) east and west wings containing shielded enclosures with remote manipulators.

The 325 HWTUs consist of three units, all within the 325 Building, located in the 300 Area on the Hanford Facility. The Shielded Analytical Laboratory (SAL) is located in Rooms 32, 200, 201, 202, and 203. The HWTU is located in Rooms 520, and 528.

The 325 HWTUs receive, store, and treat dangerous waste generated by Hanford Facility Programs (primarily from research activities in the 325 Building and other Pacific Northwest National Laboratory [PNNL] facilities). Storage in containers and bench-scale treatment of dangerous waste occur in the HWTU. At the SAL, dangerous waste is stored in a tank and is also stored in containers. Bench-scale treatment of dangerous waste also occurs at the SAL. This dangerous waste, along with contributors from the HWTU and Room 40, was previously discharged to the 340 Building via the Radioactive Liquid Waste (RLW) tank (RLWT) system. Due to the deactivation of the 340 Building, a modification to the 325 RLW system was required. As part of this modification, dangerous waste is collected, stored, and possibly treated in the RLWT system before being transported to the Double-Shell Tank (DST) System. As described in further detail in Chapter 4.0, containers are managed in accordance with WAC 173-303-630, and the tank systems are managed and operated in accordance with WAC 173-303-640.

This chapter provides a general overview of the 325 HWTUs, including:

- General description
- Topography
- Seismic consideration
- Traffic information.

A more detailed discussion of the waste types treated and stored and the identification of processes and equipment are provided in Chapters 3.0 and 4.0, respectively. It is the U.S. Department of Energy-Richland Operations Office (DOE-RL/PNNL's) position that information in this application related to radionuclides regulated pursuant to the Atomic Energy Act is provided for completeness purposes only. A further discussion of this issue is given in the General Information Portion of the Hanford Facility Dangerous Waste Permit Application (DOE/RL-91-28), Section 2.1.1.3.1.

## 2.1 DESCRIPTION OF 325 HAZARDOUS WASTE TREATMENT UNITS [B-1]

The 325 HWTUs are contained within the 325 Building, a two-story metal and concrete building with a basement level located within the 300 Area, as shown in Figure 2.1. The 325 HWTUs consist of three units: the HWTU, the SAL, and the RLWT system, which are located in portions of the basement and ground floors (Figures F2.2 and F2.3). Other non-Treatment, Storage, and Disposal (non-TSD) activities within the 325 Building include radiochemistry research, radioanalytical service, and radiochemical process development activities.

Container and tank storage limits, and annual and daily treatment limits are listed in Chapter 1.0. The regulated waste managed in the 325 HWTUs includes dangerous waste that designates as listed waste;

waste from nonspecific sources, selected waste from specific sources, characteristic waste, and state-only. Waste treatment processes could include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, and waste concentration by evaporation, precipitation, filtration, solvent extraction, phase separation, solids washing, catalytic destruction, and solidification and/or stabilization. These waste treatments are conducted on small quantities of diverse dangerous waste generated from research and development and analytical chemistry activities. Analytical and waste treatment procedures are discussed in Chapters 3.0 and 4.0.

### 2.1.1 Shielded Analytical Laboratory

The west wing of the 325 Building houses the 325B hot cell area (completed in 1963 and upgraded in the mid-1970s). The SAL consists of five rooms: basement level Room 32 and ground-floor level Rooms 200, 201, 202, and 203 (Figure 2.2). Figure 2.3 provides a drawing of Room 32 showing the location of the SAL tank.

The SAL is designed as a high-level radiation analytical chemistry area where activities are integrated with the operations of other analytical chemistry laboratories in the 325 Building. The SAL is divided into four distinct areas: the front face (Room 201), the hot cells, the back face (Rooms 200, 202, and 203), and Room 32.

The SAL includes eight hot cells, six of which are interconnected and situated side by side. Two hot cells located in Room 203 are used for work with highly radioactive materials, and not to manage dangerous waste. These two hot cells are regulated under the Atomic Energy Act. Workspace of each inter-connected cell is 1.8 meters high, 1.8 meters wide, and 1.7 meters deep. The cells are designed to handle samples with dose rates up to 2,000 rem/hour and containing up to 1,000 curies of 1 million electron volts (MeV) gamma radiation. There are 30.5 centimeters of steel in the front wall and one end wall, and 66 centimeters of magnetite concrete in the rear wall and one end wall, providing shielding equivalent to 19 centimeters of lead. The east side of each compartment, which faces into Room 201, is equipped with two manipulators and with high-density lead-glass viewing windows having the same shielding effect as the walls. These compartments are used for analytical chemistry operations. An interconnected stainless steel trough runs along the front of all the hot cells. The trough is the means by which the liquid dangerous waste is drained through stainless steel piping to the SAL tank.

The back face of the SAL is divided into three rooms (Rooms 200, 202, and 203). A special storage area exists in Room 202 for containers of dangerous waste that have been placed in specially designed overpack containers. The overpack containers provide shielding to reduce the radiological dose rate of the exterior of the overpack and secondary containment for the primary container.

The SAL hazardous waste tank system is located in Room 32, which is in the basement of the 325 Building. This tank system consists of the tank; associated piping, valves and pumps; and the secondary containment. The SAL tank is a double-walled tank constructed of stainless steel with a capacity of 1,218 liters (Figure 2.4). Detailed tank system diagrams, including ancillary equipment, are located in Appendix 4A. The tank is placed within a cylindrical stainless steel containment structure that provides tertiary containment. The liquid dangerous waste is conveyed by gravity from the trough in the SAL hot cells to the SAL tank via stainless steel drain lines. The RLW system piping is a 316L stainless steel single pipeline inside the basement. The SAL tank utilizes a remote video monitoring system and three tank-level monitoring devices. Specific information on the monitoring devices is located in Chapter 4.0, Section 4.2.2.2.

The SAL serves two purposes: (1) sample preparation and analyses of mixed waste and highly radioactive materials for various clients and (2) treatment of dangerous waste generated during analytical work within the SAL and potentially from other onsite and/or offsite facilities. Typical operations include analytical weighing, sample dissolution, sample dilution and aliquoting, digestion, distillation, titrimetric analysis, solvent extraction, and ion exchange separations. Dangerous waste treatment could include pH adjustment, ion exchange, and waste concentration by evaporation, precipitation and/or filtration and solvent extraction, solids washing, and solidification and/or stabilization. Operations are conducted by manipulator or other remote equipment. Operations in the SAL are described in detail in Chapter 4.0.

Secondary containment in the SAL is divided into three systems: the six hot cells, the front face, and the back face (Refer to Chapter 4.0).

### 2.1.2 Hazardous Waste Treatment Unit

The HWTU consists of two rooms (Rooms 520 and 528) located in the northeast corner of the main floor of the 325 Building. Dangerous waste is stored and/or treated in two of the rooms (Rooms 520 and 528). The storage of containers in the HWTU for greater than 90 days is conducted in compliance with WAC 173-303-630. A plan drawing of the HWTU is provided as Figure 2.5.

Room 520 has an overall floor area of approximately 78 square meters, which includes a main room that has a floor area of approximately 71 square meters and a closet with a floor area of approximately 6.7 square meters. Cabinets or work counter space occupies a portion of the floor area in the main room. The closet is the primary dangerous waste storage area; however, waste storage can occur throughout Room 520. Treatment of dangerous waste is conducted within the main room. The floor of Room 520 is constructed of concrete and is overlaid with a seamless chemical resistant polypropylene coating that extends approximately 10 centimeters up the walls of the room and provides secondary containment for containers in Room 520. Specific information on the HWTU secondary containment system's design and operation is found in Chapter 4.0, Section 4.1.4.1 and structural integrity in Section 4.1.5.1. Dangerous waste is stored in containers that range in size from small laboratory glassware to 208-liter containers. The smaller waste containers typically are stored within flameproof storage cabinets. Larger waste containers that can contain liquids are stored on platforms and/or otherwise protected from contact with accumulated liquids (i.e., overpacks). Containers holding solid waste can be stored on the floor. Treatment activities within the room occur primarily within small containers inside open-faced hoods and involve small quantities of waste in each batch (Refer to Chapter 4.0, Section 4.1.1.1).

Room 528 has an overall floor area of approximately 71 square meters. Cabinets and work counter space occupy a portion of the floor area. The floor of the room is constructed of concrete and is equipped with a chemical-resistant polypropylene coating that extends approximately 10 centimeters up the walls of the room and provides secondary containment for containers in Room 528. Storage and treatment of dangerous waste can occur throughout the room. Dangerous waste is stored in containers that range in size from small laboratory glassware to 208-liter containers. The smaller waste containers typically are stored within storage cabinets. Larger waste containers that can contain liquids are stored on platforms and/or otherwise protected from contact with accumulated liquids (i.e., overpacks) on the floor, while containers storing solid waste may be stored on the floor. Treatment activities within the room occur primarily within small containers in open-faced hoods or glove boxes and involve small quantities of waste in each batch.

The treatment processes used in the unit are bench-scale operations that are portable and can be conducted at various locations within the HWTU. Routine treatments that could be conducted in the HWTU include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, and waste concentration by evaporation, precipitation, filtration, phase separation, catalytic destruction, and solidification and/or stabilization.

### 2.1.3 Liquid Waste Drainage Systems

The 325 HWTUs have two drainage systems to handle liquid waste: the retention process sewer (RPS) and the RLW system. These two systems serve several laboratory and research areas in the 325 Building. Figure 2.3a shows the location of these systems in the 325 Building.

The RPS system is connected to drains in both the SAL and HWTU subunits. The RPS is utilized for disposal of wastewater that has been handled in radiation areas (including the SAL and HWTU areas) but is not expected to be radioactively contaminated. The RPS is not utilized for the disposal of dangerous waste. Unless diverted as stated in the next paragraph, the RPS effluent flows to the 300 Area Treated Effluent Disposal Facility via the process sewer lines.

RPS effluents are routed through a diversion station in the basement common area of the 325 Building. The diversion station is equipped with a radioactivity monitor, which diverts the RPS flow to the RLW system if radioactivity is detected in the RPS flow. A secondary diversion monitoring system backs up the building system. If a diversion occurs, an alarm sounds to alert the power operators who notify the building manager.

One laboratory fume hood in HWTU Room 528 is also connected to the RLW system. The liquid mixed waste is conveyed by pumps and gravity via stainless steel lines from the SAL tank, the HWTU, and the slab tanks into the RLW system. The slab tanks are located in Room 40A and collect waste water from other hot cell operations in the 325 Building that are not considered to be part of the HWTUs. The RLWT is configured, to route liquid to the RLWT where it can be treated, transferred to containers, or ~~is~~ transferred to tank casks/truck(s) and eventually transferred for storage to the DST System on the Hanford Facility.

The RLW system collects mixed waste from the SAL tank, the HWTU, and the slab tanks in a stainless steel tank located in the basement of the 325 Building. The transfer piping of the RLW system consists of four new drain lines while also utilizing some of the existing piping. The four new lines include: an extension from the existing drain in Room 32, a new drain line from Room 528, a new drain from Room 50A that connects to the existing cell drain, and a new transfer line from the RLWT to the truck lock. Waste from the RLWT system will be transferred to the truck lock where the waste will be transported to the DST via a shielded cask trailer system. Two stretches of piping from the former 340 Building. RLWT system that was associated with the HWTU is not utilized in the modified system. As discussed in Chapter 11.0, these lines were capped in place and closed during final closure activities of the former RLWT load out tank system. Figure 2.3b provides a schematic of the modified RLWT system.

### 2.1.4 Other Environmental Permits

Applicable federal and state laws and local requirements are discussed in Chapter 13.0 of the General Information Portion (DOE/RL-91-28).

## 2.2 TOPOGRAPHIC MAP [B-2]

A topographic map, H-13-000197, showing a distance of at least 305 meters around the 325 HWTUs, is provided in Appendix 2A. The contour internal (0.5 meter) shows the general pattern of surface water flow in the vicinity of the 325 HWTUs. The map contains the following information:

| | |
|---|---|
| Map scale | Access control |
| Date | 100-year flood plain |
| Prevailing wind speed | Injection and withdrawal wells and direction |
| Sewer systems | A north arrow |
| Loading/unloading areas | Surrounding land use |
| Fire control | Buildings |
| Access road location | |

## 2.3 SEISMIC STANDARD [B-3]

The 325 HWTUs are located in Benton County, Washington, in Zone 2B as identified in the *Uniform Building Code* (ICBO 1991). No active faults, or evidence of a fault that has had displacement during Holocene times, have been found on the Hanford Facility (DOE 1988). The youngest faults recognized on the Hanford Facility occur on Gable Mountain, approximately 38 kilometers northwest of the 300 Area. These faults are of Quaternary age and are considered "capable" by the U.S. Nuclear Regulatory Commission (NRC 1982).

The 325 Building was evaluated to assess building structure adequacy to withstand a Design Basis Earthquake (DBE) found in URCL-15910, Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards. This DBE corresponds to a horizontal ground acceleration of 0.135g with a 5000-year return period. The 325 building was found to be able to withstand the 0.135g site specific DBE without major structural damage (WHC 1992).

## 2.4 TRAFFIC INFORMATION FOR THE 325 HAZARDOUS WASTE TREATMENT UNITS [B-4]

General traffic information for the Hanford Facility is presented in the *Hanford Facility Dangerous Waste Permit Application, General Information Portion* (DOE/RL-91-28).

Access to the 300 Area by vehicular traffic is by Stevens Drive and George Washington Way. Traffic on Stevens Drive consists of personal vehicles, buses for the transport of personnel to and from work, and light-or medium-duty trucks for the transport of materials. Traffic on the capillary routes is private vehicles destined for designated parking areas, buses for the transport of personnel to and from work, and light-or medium-duty trucks for the transport of materials.

Personnel have access to the 325 Building through multiple pedestrian gates located on the 300 Area perimeter. Vehicular traffic to the 325 Building is limited to DOE-RL, or contractor-owned vehicles only. No new routes are needed. Maximum-posted speed within the 300 Area is 24 kilometers per hour. Traffic destined for adjacent buildings averages 10 to 15 vehicles per day and ranges from passenger cars to heavy trucks. All roads within the 300 Area are paved, all-weather roads.

Waste generated at laboratories within the 300 Area will be transferred to the 325 HWTUs over roads where public access is prohibited. All access to the 300 Area (except the outer parking lot) is controlled by the DOE-RL and limited to personnel holding appropriate clearances. In the immediate area of the 325 Building, vehicular traffic is limited to vehicles on official business. Traffic destined for the 325 Building travels over roads designed to handle truck traffic. An estimated one or two waste transfers to or from the 325 HWTUs occur per week. Waste transfers from the RLWT system in the 325 Building to the 200 East Area will occur via an approved casks transportation system based on a Hanford Site Safety Analysis Report for Packaging. These waste transfers are anticipated to occur about three times per year.

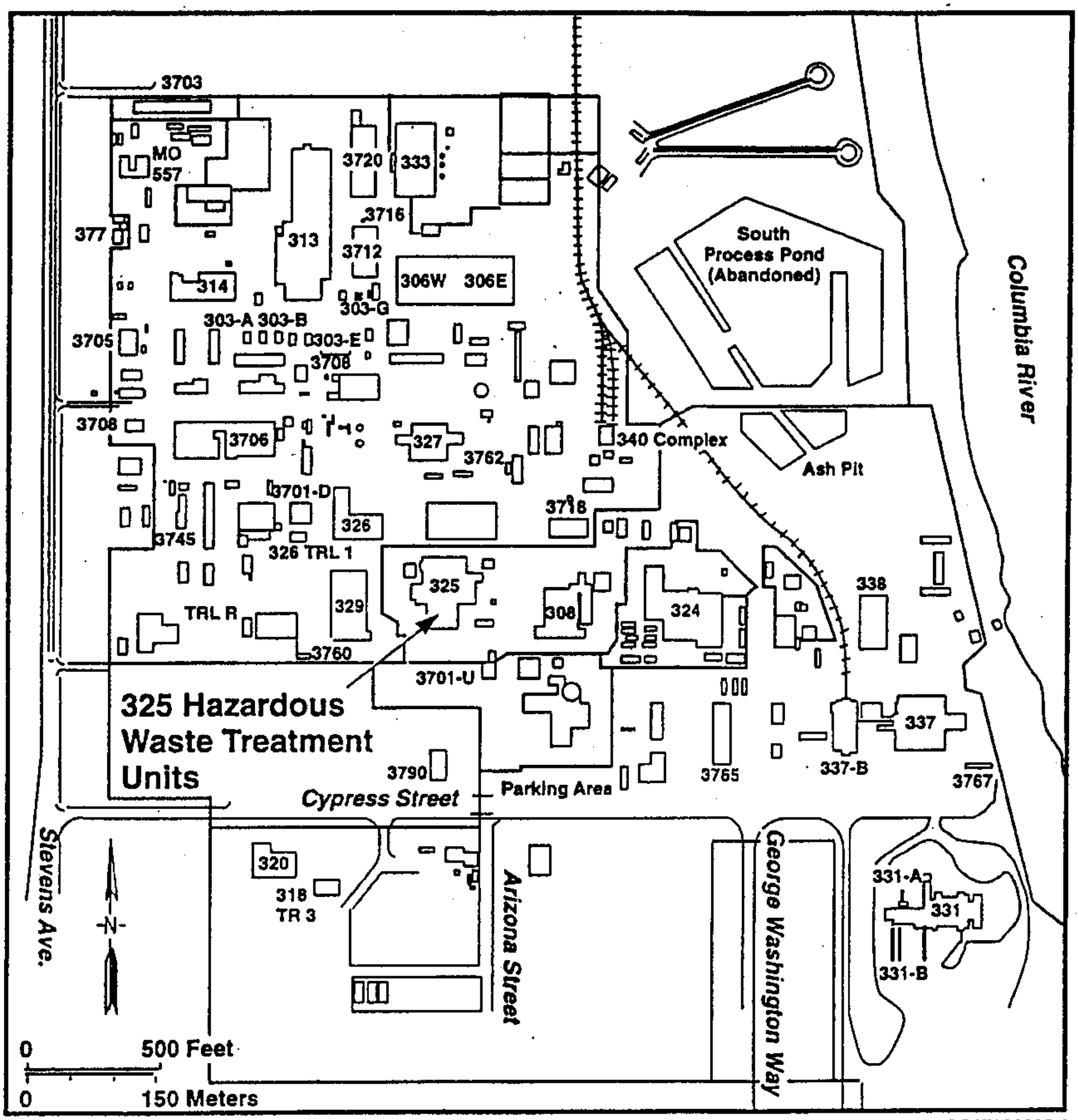
The dangerous waste is transferred in accordance with applicable onsite and/or offsite requirements including Condition II.Q of the Hanford Facility RCRA Permit. Although many onsite waste transfers are exempt from the manifest requirements of WAC 173-303-370, onsite waste tracking is applied as a matter of good management practice. These onsite transfer requirements are designed to ensure that personnel exposures are maintained as low as reasonably achievable (ALARA), that loss of contamination control is prevented, and that applicable transportation regulations be obeyed.

## 2.5 RELEASE FROM SOLID WASTE MANAGEMENT UNITS [E]

Information concerning releases from solid waste management units is discussed in the General Information Portion (DOE/RL-91-28).

1

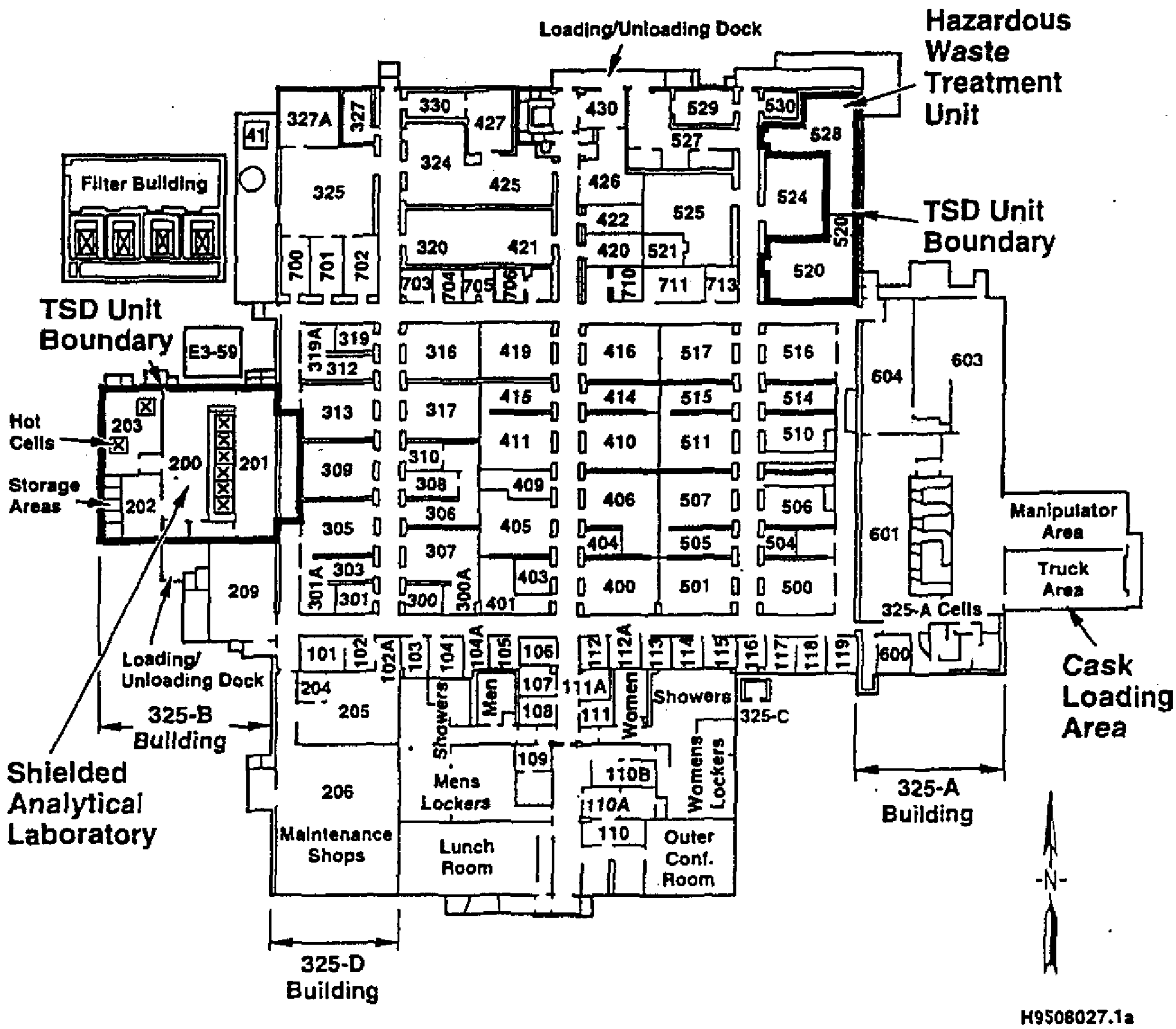
**Figure 2-1. 300 Area**




2

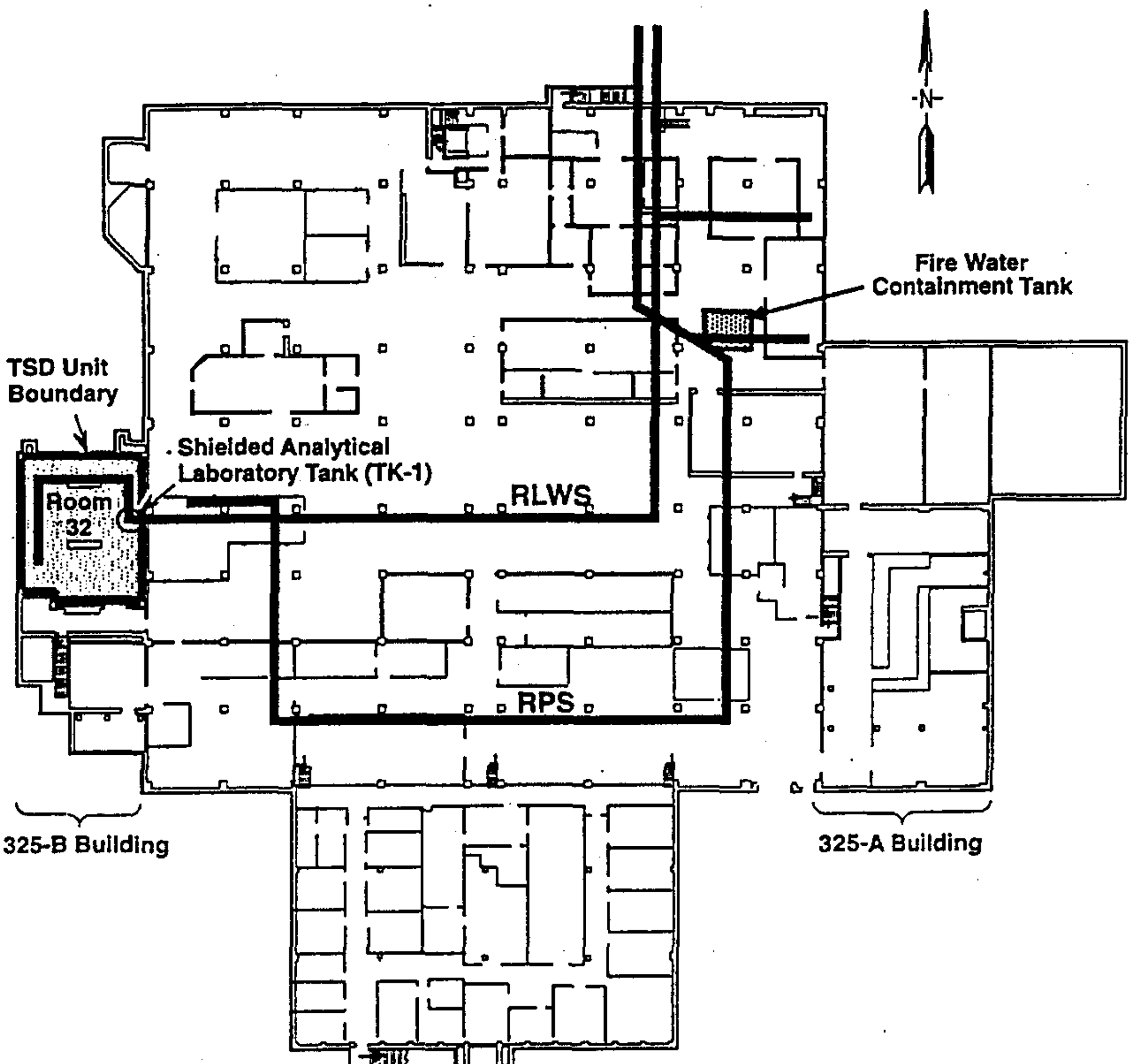
SG97030295.4

**Figure 2-2. Location of 325 HWTUs–Ground Floor Areas**



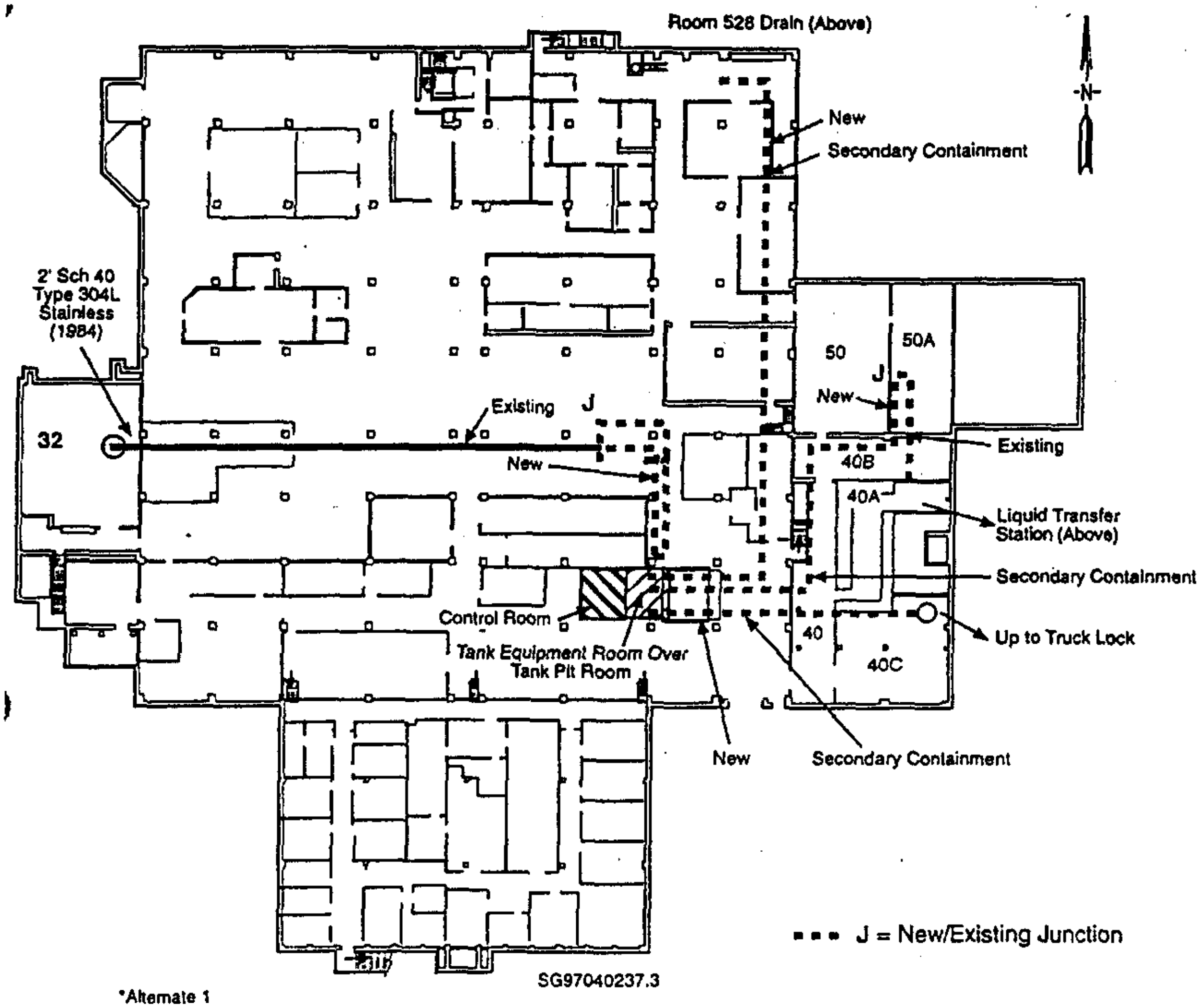
1 **Figure 2-3. Location of 325 HWTUs–Basement Areas**

2




3

1 **Figure 2-4. 325 Building RWLS Modifications**




Basement Plan
Scale 1" = 61'

2

3

**Figure 2-5. Shielded Analytical Laboratory Tank**

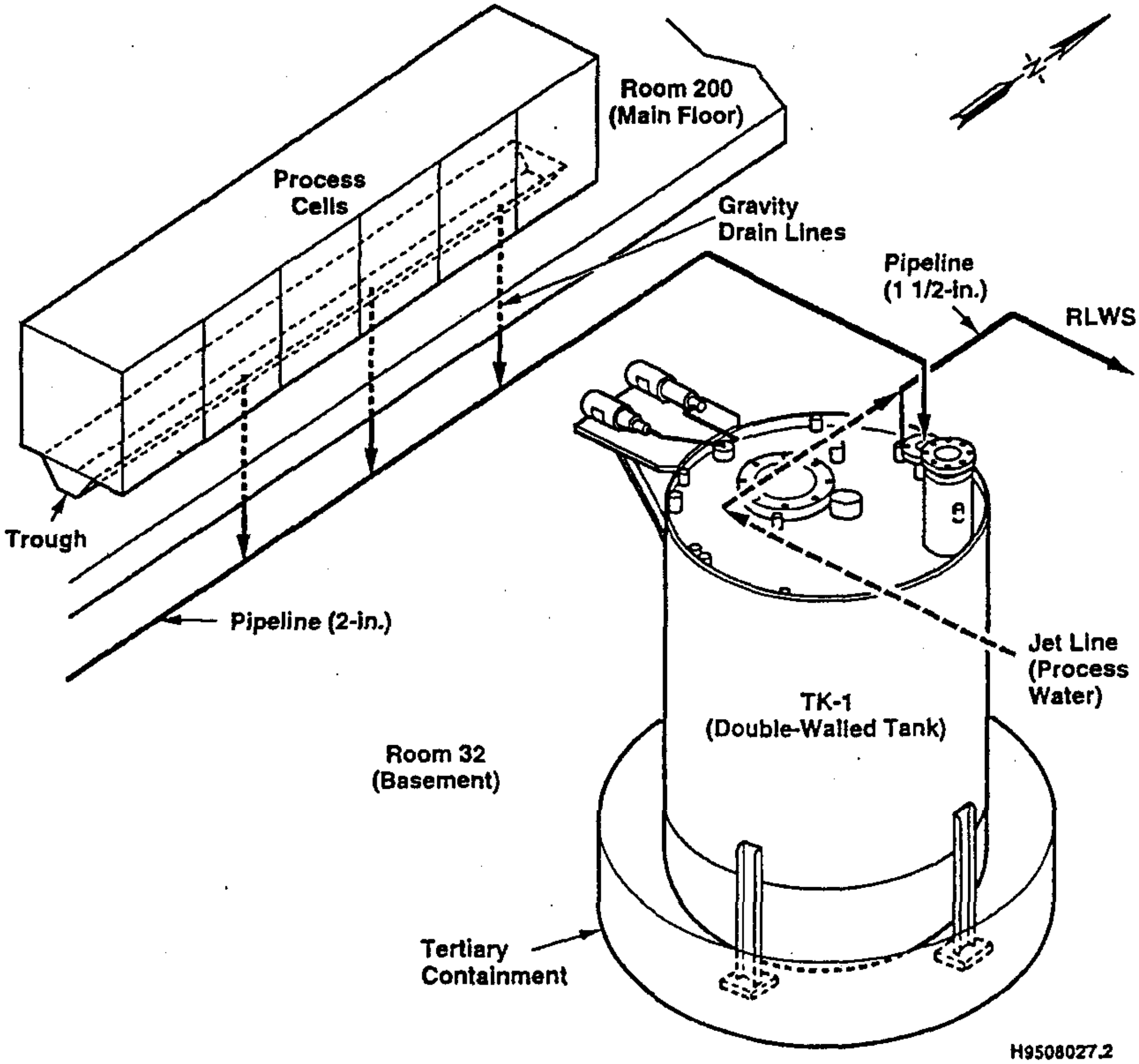
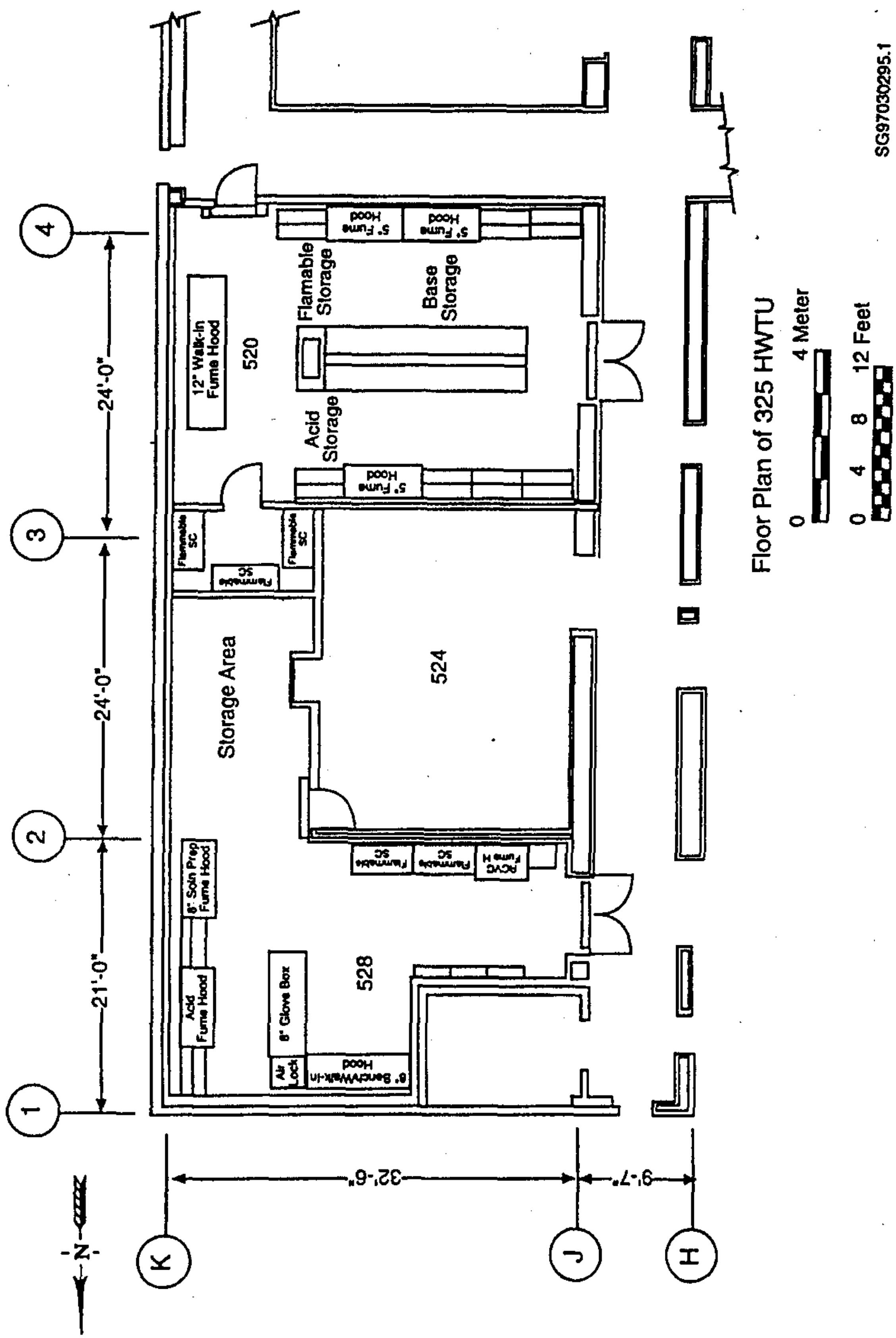


**Figure 2-6. Layout of Hazardous Waste Treatment Unit**



# 4.0 CONTENTS



## FIGURES



## TABLE



## APPENDIX

# 4.0 PROCESS INFORMATION [D]

This chapter provides a description of waste management, equipment, treatment processes, and storage operations.

## 4.1 CONTAINERS [D-1]

The following sections describe the management of dangerous waste in containers at the 325 HWTUs. Container management occurs at both the HWTU and the SAL. Both portions of the 325 HWTUs are used to store and treat dangerous waste generated from onsite programs, primarily as a result of laboratory analytical activities in the 325 Building and other PNNL facilities. Descriptions of the containers used are provided in the sections that follow for the HWTU and SAL.

### 4.1.1 Description of Containers [D-1a]

The following sections describe the types of containers used for dangerous waste storage and treatment in the 325 HWTUs.

#### 4.1.1.1 Containers Located in the Hazardous Waste Treatment Unit

Rooms 520 and 528 of the HWTU are used to store and treat dangerous waste generated primarily from laboratory operations 0throughout the 325 Building and the Hanford Facility. The containers used to store and treat dangerous waste vary widely from original manufacturer containers to laboratory glassware for sample analysis or to 322-liter containers used to overpack smaller containers. Containers used for storage or treatment of dangerous waste are compatible with the waste stored in them. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and steel lined with plastic. Table 4.1 provides an example of the types of containers that could be used in the HWTU rooms, including the material of construction and the capacity of the container.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR as required by WAC 173-303-190.

All flammable liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable storage. Solid chemicals are stored on shelving in specifically designated areas based on the hazard classification.

#### 4.1.1.2 Shielded Analytical Laboratory Containers.

The primary function of the SAL is to conduct analysis of samples of waste streams collected at various locations on the Hanford Facility. The types of containers used to store dangerous waste in the SAL can vary widely from the original containers to laboratory glassware for sample analysis to 322-liter containers used to overpack smaller containers.

The containers used for storage or treatment of dangerous waste are compatible with the waste stored in the containers. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and steel lined with plastic. Table 4.1 provides an example of the types of container that could be used in the SAL, including the material of construction and the capacity of the container.

Rooms 32, 200, 202, and 203 are used to store dangerous waste in containers. The back face of the SAL is typically used to store waste in the larger containers. These containers include various types of 208-liter steel containers (lined and unlined). Because of the nature of some dangerous waste being stored at the SAL, it is often necessary that these standard 208-liter containers be modified. This modification ensures that the containers are specially shielded to reduce the hazard of the radioactive component of the dangerous waste stored in the container and are compliant with the ALARA criteria. These specially designed shielded containers are packaged to contain anywhere from 3.79 liters to 53 liters of waste depending on the amount of shielding required. The solid waste typically is packed in individual 3.79-liter to 4.73-liter containers before placement in the 208-liter shielded container. The shielding is accomplished by surrounding the small containers with concrete, lead, or other materials to reduce the dose rate produced by the radiological component of the dangerous waste.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR are required by WAC 173-303-190.

All flammable liquid waste is segregated from any incompatible waste types and packaged in approved containers.

### 4.1.2 Container Management Practices [D-1b]

Management practices and procedures for containers of dangerous waste ensure the safe receipt, handling, preparation for transfer, and transportation of the waste. The following sections describe the container management practices used for the HWTU and the SAL. Table 4.1 lists the typical containers used in the 325 HWTUs.

#### 4.1.2.1 Hazardous Waste Treatment Unit Container Management Practices.

Dangerous waste containers are inspected for integrity and adequate seals before being accepted at the HWTU. Waste received for storage and treatment from outside Rooms 520 and 528 is either picked up by HWTU personnel or moved to Rooms 520 and 528 in containers suitable for the waste. Depending on the container weight, size or number of containers to be moved, container(s) of dangerous waste are hand carried or moved on a platform or handcart, as appropriate, to Rooms 520 or 528. 325 HWTUs staff moves the dangerous containers in accordance with 325 HWTUs collection procedures that address safety and hazard consideration. These procedures cover various waste types (transuranic (TRU) and low-level) and transportation modes. 325 HWTUs staff does not perform the operations, covered by a procedure, until they are formally trained on the procedure.

Containers in poor condition or inadequate for storage (e.g., damaged, not intact, or not securely sealed to prevent leakage) are not accepted at Rooms 520 and 528. Examples of acceptable packaging include laboratory reagent bottles, U.S. Department of Transportation-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been overpacked, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria of WAC 173-303-190 and to use professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment. Container stacking is not performed.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections is in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Chapter 6.0, Section 6.2. Containers are inspected for integrity before acceptance at or transport to the HWTU. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All HWTU staff is instructed in proper container handling and spill prevention safeguards as part of their training (Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)a). All personnel are trained and all operations are conducted to ensure that containers are not opened, handled, or stored in a manner that would cause the container to leak or rupture. All flammable cabinets containing dangerous waste are maintained with a minimum of 76 centimeters of aisle space in front of the doors. The walk-in fume hood containing the 208-liter containers is designed to hold four 208-liter containers and has over 76 centimeters of aisle space; the containers are not stacked in the hood. Waste-handling operations can be conducted only when two or more persons are present in the unit or when the personnel present have immediate access to a communication device such as a telephone or hand-held radio.

### 4.1.2.2 Shielded Analytical Laboratory Container Management Practices.

Containers are not opened, handled, or stored in a manner that would cause the containers to leak or rupture. Containers will remain closed except when sampling, adding, or removing waste; or when analysis or treatment of the waste is ongoing. Containers of incompatible waste are segregated in the storage areas. In-cell containers will be stacked no more than four high and labels will not be obscured.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections is in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Chapter 6.0, Section 6.2. Containers are inspected for integrity before acceptance at or transport to the SAL. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All personnel are instructed in proper container-handling safeguards as part of their training (Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)(a).

All container handling in the hot cells must be performed remotely with manipulators. Waste samples managed in the SAL enter the cells through rotating transfer wheels located in the back walls of cells 1, 2, and 6 and through a 17.8-centimeter borehole in the back wall of cell 1. Waste samples are moved into and out of the cells at these locations according to approved procedures that vary with the radioactivity level of the sample. After analysis of the sample and necessary confirmation of results, compatible solid waste samples are consolidated into appropriate size containers often referred to as 'paint cans' and usually stored in cell 1. However, any of the cells can be used for storage of waste during operations.

After evaluation for treatment and the subsequent treatment, liquid waste is either transferred to the SAL tank (discussed in Section 4.2) or solidified and repackaged into shielded 208-liter containers and stored in the back face area of the SAL. Waste generated outside of the hot cells is placed into appropriately sized containers and stored until packaged for shipment or transfer. Waste-handling operations are conducted outside of the cells only when a minimum of two persons are present in the unit or when the personnel present has immediate access to a communication device such as a telephone or hand-held radio.

### 4.1.3 Container Labeling [D-1c}.1.3

Once the material has been designated as a dangerous waste, all containers are marked and/or labeled to describe the content of the container as required by WAC 173-303-395. Containers also are marked with a unique identifying number assigned by the generating unit. All containers used for transfer of dangerous waste are prepared for transport in accordance with WAC 173-303-190.

### 4.1.4 Containment Requirements for Storing Containers [D-1d and D-1d(1)(a)]

A description of secondary containment system design and operation is provided for the HWTU and SAL in this section.

#### 4.1.4.1 Secondary Containment System Design and Operation for the Hazardous Waste Treatment Unit

The secondary containment system for the HWTU has three primary components: uniform fire code-approved flammable liquid storage cabinets, the floor of the rooms, and the fire water containment system (Figure 4.1).

Mixed and/or dangerous waste, in containers of 65 liters or less, is stored in Room 520 in steel flammable storage cabinets located in a storage room that forms the northeast corner of the room. An additional flammable storage cabinet is located beneath a stainless steel ventilated hood located along the south wall of Room 520. Containers over 65 liters are stored in a hood located along the east wall of the room. The containers are made of stainless steel or other suitable material depending on the characteristics of the waste and are kept closed except when waste is being added or withdrawn.

Dangerous waste in containers of 65 liters or less is stored in Room 528 steel storage cabinets in accordance with WAC 173-303-395(1)(a) and the Uniform Building Code (ICBO 1991). There are five storage cabinets, three for flammable waste and two for corrosive waste. Two cabinets (one flammable storage cabinet and one corrosive storage cabinet) are located along the north wall of the room. A cabinet for corrosive waste is located along the east wall. A cabinet for flammable waste also is located along the south wall. Further storage is provided by a flammable cabinet located beneath a stainless steel ventilated hood on the east wall of the room. Each cabinet is clearly marked as containing either flammable or corrosive waste. Flammable waste cabinets are painted yellow, and corrosive cabinets are painted blue.

Rooms 520 and 528 are located on the main floor of the 325 Building and are constructed of concrete. The concrete floors of both rooms have been equipped with a heat-sealed seamless chemical-resistant polypropylene coating that covers the entire floor area of both rooms and laps approximately 10 centimeters up all of the outside walls of each room. The coated floor is capable of containing minor spills and leaks of liquid mixed waste. In addition, because the floors are not sloped, waste containers stored on the floors are elevated or otherwise protected to prevent the container from coming in contact with spilled waste.

Major spills or leaks of liquid mixed waste flow into the fire water containment system. The fire water containment system consists of floor trenches located at each entrance to the rooms and the fire water containment tank located in the basement of the building. The system is designed to collect the fire-suppression water in the event that the automatic sprinkler system was activated. The location of the trenches is shown in Figure 4.1.

The floor trenches located under the double doors on the west side of Rooms 520 and 528 are approximately 20 centimeters wide, 46 centimeters deep and 1.91 meters long. The floor trench located under the single south door of Room 520 is approximately 20 centimeters wide, 46 centimeters deep, and 1.5 meters long. The floor trench located under the single southwest door of Room 528 is 20 centimeters wide, 61 centimeters deep, and 1.5 meters long. The trenches extend completely across the entrance of each room so that liquids do not flow out through a doorway. The trenches are constructed of 14-gauge stainless steel and are equipped with a steel grate cover. All seams are welded to ensure integrity. Trenches under the double doors are equipped with two drains in the bottom, and trenches located under single doors are equipped with one drain to allow liquid to drain from the trench through 15-centimeter-diameter carbon steel piping to the fire water containment tank.

The fire water containment tank is located beneath Room 520 in the basement of the 325 Building. The rectangular tank has dimensions of 1.65 meters by 2.25 meters by 1.92 meters and a capacity of 22,710 liters. The sides and floor of the tank are constructed of epoxy-coated carbon steel plate. The steel sides and floor provide support for the chemical-resistant polypropylene liner. The tank is secured to the concrete floor of the 325 Building basement with 1.3-centimeter bolts at 1.82-meter intervals.

The possibility of mixing incompatible waste in the containment system is minimized, because the number of containers open at one time will be limited to those in process (waste not in process is stored in closed containers). In addition, the very large volume of any firewater flow would dilute waste and would minimize the possibility of adverse reactions.

#### 4.1.4.2 Secondary Containment System Design and Operation for the Shielded Analytical Laboratory

The secondary containment in the SAL is divided into three systems: the six hot cells, the front face, and the back face. Figure 4.2 provides a first floor plan view depicting these three areas.

The secondary containment for the six hot cells consists of the stainless steel base of the cell and a continuous trough located on the east side of the cells. The hot cell secondary containment system is shown in Figure 4.2. The base and trough can collect leaks and spills generated during analytical chemistry operations. The stainless steel bases are approximately 0.55 square meter. The troughs are approximately 15.2 centimeters wide, 7.6 centimeters deep, and extend across the entire 1.82-meter width of each cell. The troughs are equipped with a stainless steel grate cover. The leaks and spills are drained by gravity through drains in the bottom of the trough and through stainless steel piping to the SAL tank located in the basement (Room 32). The SAL tank is constructed of stainless steel and has a capacity of 1,218 liters. Design and operating specifications are provided in Section 4.2.

The secondary containment system for the back face of the SAL consists of shielded 208-liter containers and plastic containers. Solid mixed waste is packaged in containers (e.g., paint cans, bottles, bags) before removal from the hot cells. Once removed from the hot cells, the containers are placed into specially designed, shielded 208-liter containers to provide secondary containment. Containers of liquid waste are placed into plastic containers that provide secondary containment and prevent spilled liquids from contacting other waste containers. Some containers are placed in shielded cubicles in Room 202 depending on container dose rates. The location of the cubicles is shown in Figure 4.2.

The secondary containment system for the front face of the SAL, which is minimally used to store mixed waste, is similar to the system for the back face. Containers holding liquid and solid mixed waste are placed into containers to provide secondary containment; the primary area for mixed waste storage is the fume hood.

### 4.1.5 Structural Integrity of Base [D-1d(1)(b)

A description of the requirements for base or liner to contain liquid is provided in the following sections for the HWTU and the SAL.

#### 4.1.5.1 Requirements for Base or Liner to Contain Liquids in the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 have been equipped with the chemical-resistant polypropylene coating. All seams in the coating were finished by heat welding to ensure the integrity of the coating. The coating currently is free of cracks and gaps and will be maintained that way throughout the life of the HWTU. The condition of the floor is inspected weekly as part of the inspection program (Chapter 6.0). Floor coating assessment is carried out whenever the floor coating is observed to have been chipped, bubbled up, scraped, or otherwise damaged in a manner that would impact the ability of the coating to contain spilled materials. Minor nicks and small chips resulting from normal operations are repaired periodically.

The floor coating holds any spilled liquid until the liquid is cleaned up or enters the drains in each room. Once the liquid has entered the drains, the liquid drains into the fire water containment tank in the basement, where the liquid is stored pending chemical analysis and treatment and/or disposal.

The base of the HWTU floors consists of 14.2 centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete is mixed in accordance with ASTM 094, Section 5.3, Alternate 2, and is finished with a smooth troweled surface. The concrete base has a load capacity of 976 kilograms per square meter.

The floor trenches that prevent liquids from migrating from the HWTU rooms are constructed of 14-gauge stainless steel. All seams are welded and the connections with the drains are tight. The stainless steel is compatible with and resistant to the liquid mixed waste managed in the HWTU.

#### 4.1.5.2 Requirements for Base or Liner to Contain Liquids in the Shielded Analytical Laboratory

The base currently is free of cracks and gaps and will be maintained that way throughout the life of the SAL. The base of the floor for the six hot cells consists of a 0.48-centimeter layer of stainless steel formed on top of poured concrete. The stainless steel base is compatible with most of the waste generated in the hot cells. The exceptions are waste containing hydrofluoric acid and high concentrations of hydrochloric acids. This waste is stored in individual secondary containment to prevent contact of the waste with the stainless steel in the event that a primary waste container was to fail. Because the volumes of waste generated and stored are small, and because the hot cell floors are not sloped, any waste spilled during waste handling activities probably would remain in a localized area and be cleaned up expeditiously to ensure that no damage occurs to the stainless steel. As was previously discussed, a stainless steel tank provides the secondary containment system for the six cells. Liner and base requirements for the SAL tank are discussed in Section 4.2.

The bases of the back face and front face of the SAL consist of a 15.2 centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete base has a load capacity of 976 kilograms per square meter. The base in Room 201 is topped with a seamless chemical resistant polypropylene coating. Rooms 202 and 203 are topped with epoxy based paint. In Room 200, the concrete slab is painted, and there is a trap door in the painted floor of Room 200 that enables transfer of equipment between Rooms 200 and 32. The airflow between these rooms is from Room 200 to Room 32 due to positive air pressure in Room 200.

### *4.1.6 Containment System Drainage*

A description of the containment system drainage for the HWTU and SAL is provided in this section.

#### 4.1.6.1 Containment System Drainage for the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 are not sloped. Small spills of liquid probably will remain in a localized area until the spills are cleaned up. All containers of dangerous waste are stored either in drums, on shelves within open-faced hoods, or within flammable or corrosives storage cabinets to prevent the containers from contacting spilled materials. Large spills of liquid material would spread laterally across the flat surface of the floor. The flow of the spilled liquid would be stopped by an outside wall(s) of the room or by one of the trenches protecting the entrances to the room. The lower 10 centimeters of the outside walls of the rooms are covered with the same chemical-resistant coating as that on the floor to prevent spills from migrating throughout the walls.

The floor drains across each exit drain spill to an emergency firewater containment tank (22,710-liter capacity) located in the basement of the 325 Building. The tank captures all drained liquid, where the liquid is stored until sampling and analysis indicates a proper treatment and/or disposal method.

#### 4.1.6.2 Containment System Drainage for the Shielded Analytical Laboratory

The stainless steel base of the hot cell is not sloped. Because of the small volume of waste that is handled, small spills probably would remain in a localized area until the spills are cleaned up. As a result, all containers of liquid mixed waste are stored within secondary containment to prevent spilled liquids from contacting the containers. Large spills that occur within the SAL hot cells flow to the stainless steel trough at the front of each cell, which gravity drains into the SAL tank (TK-1, Room 32).

The bases of the front and back faces are not sloped. Containers in these areas are stored within secondary containment and off the base surface to prevent spilled liquids from contacting the containers.

### 4.1.7 Containment System Capacity [D-1d(1)(c)

A description of the containment system capacity for the HWTU and SAL is provided in the following sections.

#### *4.1.7.1 Containment System Capacity for the Hazardous Waste Treatment Unit*

The maximum combined total volume of all containers of dangerous waste stored in both HWTU rooms is 10,000 liters. The largest mixed waste storage container is a 322-liter container. The fire water containment tank provides secondary containment for both HWTU rooms. The capacity of the fire water containment tank is 22,710 liters; therefore, the containment system is more than adequate to contain either 10 percent of the total volume of waste (2,840 liters) or the entire volume of the largest container (322 liters).

#### 4.1.7.2 Containment System Capacity for the Shielded Analytical Laboratory

The largest container of liquid waste to be stored in the hot cells is a 7.6-liter container.

The SAL tank is considered to be the secondary containment for the hot cells. The largest quantity of liquid that could be stored in the hot cells while maintaining adequate (10 percent of total volume) secondary containment would be 12,491 liters. The total amount of liquid to be stored in the hot cells is governed by the area constraint of the cells. Typically, the largest amount of liquid waste to be stored in the hot cells at one time is 75.8 liters.

Liquid waste stored in Room 201 is stored in the fume hood. The waste is stored in glass or plastic bottles that are each placed in individual plastic containers of a size that is sufficient to hold all of the contents of the inner vessel. The quantity of liquid waste stored in the hood is governed by the area constraint in the hood. Similarly, liquid waste stored in Room 202 is stored in glass or plastic bottles that are each placed in individual secondary containment.

The floors of the front face and back face are constructed of concrete. The rear face floor in Rooms 202 and 203 is covered with epoxy paint. Floor drains flow to the retention process sewer (RPS) system, which has a diverter triggered by a radiation monitor that diverts radioactive liquids detected in the RPS line to the RLWS. Because of the small quantities of liquid stored in the front face and back face, any spill that is not contained by the plastic overpack probably would remain on the floor in a localized area until cleaned. Any liquid that managed to flow to the room drains would be conveyed by gravity to the RPS system or, depending on radionuclide content, to the RLWS and into the RLWT.

## 4.1.8 Control of run-on [D-1d(1)(d)

Run-on control for the HWTU and SAL is described in the following sections.

### 4.1.8.1 Control of run-on for the Hazardous Waste Treatment Unit

The 325 Building mitigates the possibility of run-on for the HWTU. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

### 4.1.8.2 Control of run-on for the Shielded Analytical Lab

The 325 Building mitigates the possibility of run-on for the SAL. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

## 4.1.9 Removal of Liquids from Containment System [D-1d(2)]

The removal of liquids from the containment system for the HWTU and SAL is described in the following sections.

### 4.1.9.1 Removal of Liquids from the Hazardous Waste Treatment Unit Containment System

On discovery of liquid accumulation in the containment resulting from a spill or other release, the Building Emergency Director (BED) must be contacted in accordance with the contingency plan (Chapter 7.0). The BED may determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area might be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Liquid spills are contained within the Room 520 or Room 528 floor or within the fire water containment tank. Localized spills of liquids to the floor of the HWTU rooms are absorbed with an appropriate absorbent (after the appropriate chemical reaction has occurred to neutralize reactivity in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material is recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material are disposed of in an appropriate manner. If spilled materials in the HWTU reach the firewater containment tank, the material will be held in place until chemical analysis indicates an appropriate treatment and/or disposal method. The waste analysis procedures and analytical methods used to designate the spilled materials are described in the waste analysis plan, Appendix 3A. The tank is designed to allow easy access for material sampling. Depending on the results of the analysis, the collected spill material is pumped to the RLWS or pumped to the RPS.

#### 4.1.9.2 Removal of Liquids from the Shielded Analytical Laboratory Containment System

The removal of liquid from the SAL tank, which provides the secondary containment for the six hot cells, is discussed in Section 4.2. The tank will be emptied after the accumulated waste is designated.

On discovery of liquid accumulation in the back or front face containment resulting from a spill or other release, the BED must be contacted in accordance with the contingency plan (Chapter 7.0). The BED could determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area could be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Localized spills of liquids to the floor of the SAL will be absorbed with an appropriate absorbent (after the appropriate chemical reaction to neutralize reactivity has occurred in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material will be recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material will be disposed of in accordance with applicable regulations and PNNL internal waste management procedures.

### 4.1.10 Management of Ignitable and Reactive Waste in Containers [D-1f(1) and D-1f(2)]

Management of ignitable and reactive-waste in containers within the HWTU and SAL is described in the following sections.

#### 4.1.10.1 Management of Ignitable and Reactive Waste in Containers in the Hazardous Waste Treatment Units

Ignitable and reactive waste are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the HWTUs.

#### 4.1.10.2 Management of Ignitable and Reactive Waste in Containers in the Shielded Analytical Laboratory

Ignitable and reactive waste are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the SAL.

### 4.1.11 Management of Incompatible Waste in Containers [D-1f(3)]

The prevention of reaction of ignitable, reactive, and incompatible waste in containers for the 325 HWTUs is discussed in the following sections.

#### 4.1.11.1 Management of Incompatible Waste in Containers at the Hazardous Waste Treatment Unit

Containers of ignitable and reactive waste are stored in segregated flammable storage cabinets. Chapter 6.0, Section 6.5.2, describes the methods used to determine the compatibility of dangerous waste so that incompatible waste is not stored together. Incompatible waste is never placed in the same container or in unwashed containers that previously held incompatible waste. Operations are conducted such that extreme heat or pressure, fire or explosions, or violent reactions do not occur; uncontrolled toxic mists, fumes, dust, or gases in sufficient quantities to threaten human health or the environment are not produced; uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion are not produced; and damage to the container does not occur. Information on the hazard classification of waste accepted by the HWTU is documented by the generating unit, which is carefully reviewed by HWTU personnel before waste acceptance. Mixing of incompatible waste is prevented through waste segregation and storage. As the containers received in the HWTU usually are smaller than 19 liters, the most common segregation is performed by storage of incompatible hazard classes in separate chemical storage cabinets. Guidance for the segregation is provided in Chapter 6.0, Section 6.5.2.

Minimum aisle space is maintained according to the Uniform Fire Code to separate incompatible waste. The possibility of adverse reaction is minimized (Chapter 6.0, Sections 6.6 and 6.7 for methods used to prevent source of ignition).

#### 4.1.11.2 Management of Incompatible Waste in Containers at the Shielded Analytical Laboratory

Incompatible waste in the SAL hot cells is managed by placing primary containers into a second container or tray capable of managing any leak or spilled material. Incompatible waste is never placed in the same container or in an unwashed container that previously held incompatible waste.

Treatment operations are conducted with minor amounts of waste to ensure that extreme heat or pressure, fire, or explosive or violent reactions do not occur. Potential releases would be controlled by the ventilation system that exhausts through two high-efficiency particulate air (HEPA) filters set in series, and due to the limited amount of waste in the SAL. These HEPA filters are part of the building exhaust system, which is maintained and inspected routinely in accordance with PNNL preventive maintenance standards. Radioactive and nonradioactive emissions from the 325 Building stack, and control devices for those emissions, are regulated by the Washington State Department of Health pursuant to Chapter 246-247 WAC, and the Washington State Department of Ecology (Ecology) pursuant to Chapters 173-400, 173-401, and 173-460 WAC, respectively. Air-pressure barriers for containment control are achieved by supplying air from areas of least contamination (i.e., offices) to areas of higher contamination (i.e., cells). *These systems ensure proper emission flow through the* HEPA filters.

Because waste normally is treated in the SAL hot cells, human exposure to the remote potential of mixing incompatible waste or reactive waste is minimal. Waste generated and treated within the SAL hot cells is stored within separate secondary containers, which eliminates the potential for combining incompatible waste. Waste stored in the front or back face of the SAL is packaged by hazard classes for transfer or is segregated in separate secondary containment.

## 4.2 TANK SYSTEMS

The following sections describe the management of dangerous waste in the 325 tank systems. Each tank system consists of the tank; associated piping, valves and pumps; and secondary containment. The first tank system is located in Room 32 of the SAL and is used to collect liquid waste generated from the analytical laboratory operations. This SAL tank system is described in Section 4.2.1. The second tank system is the RLWT system. This tank system is used to collect liquid waste discharged to the RLWS prior to being transferred to the DST System. The RLWS load out tank system will be operated as described in Section 4.2.2.

### 4.2.1 Shielded Analytical Laboratory Tank System

The SAL is an analytical chemistry laboratory used primarily to prepare and analyze samples of dangerous waste streams for waste characterization. This work is conducted in six inter-connected hot cells that form the nucleus of the SAL. Liquid waste generated during these operations is collected, treated if necessary, and drained from the hot cells to the SAL tank located in Room 32 of the basement directly below the hot cells. A stainless steel trough, 15.2 centimeters wide by 7.62 centimeters deep, traverses the front of all six hot cells in which solution is poured. The trough is equipped with stainless steel grating to capture solids during solution pour. The trough collects any liquid waste poured from analytical chemistry operations, mixed waste treatment operations, other chemical and mixed waste stored in the hot cells, and spills or leaks. The liquid waste is transferred through a common stainless steel pipeline that drains into the SAL tank. The waste is batch transferred from the SAL tank to the radioactive liquid waste system and into the RLWT. The SAL tank volume is 1,218 liters and has a throughput of 80,000 liters per year.

#### 4.2.1.1 Design, Installation, and Assessment of Tank Systems [D-2a]

The following sections discuss the design and installation of the SAL tank and provide information on the integrity assessment.

4.2.1.1.1 Design Requirements [D-2a(1)]

Waste stored in the SAL tank has a pH between 7 and 12. The tank is constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank. All waste is treated or reacted before introduction into the tank to meet RLWS waste acceptance criteria.

The tank system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation. The professional engineer evaluation is included in the tank integrity assessment.

The SAL tank is a vertical double-shell tank supported by 3 legs and stands approximately 1.7 meters above the ground. The top head is a 0.95-centimeter-thick flat stainless steel plate. Both bottom heads are flanged and dished heads (torispherical), and the bottom height is 10.2 centimeters above ground. The inner shell is 107 centimeters outside diameter, the outer shell is 114 centimeters outside diameter, and each shell is 0.8-centimeter-thick stainless steel plate. The tank is located inside a containment pan that has a 203-centimeter diameter and is 51 centimeters high; the total volume of the pan is 1,648 liters. The pan provides for secondary containment of leaks from the tank, piping, and ancillary equipment and instruments located above the tank. Flanged and threaded connections are located within the containment boundary of the pan to capture any leaks that might occur from these connections. Outside the containment area, all connections are welded. There are no outlets, drainage or otherwise, on the bottom or sides of the tank. Appendix 4A contains engineering drawings.

Solution enters the tank through a gravity flow, welded drain line piped from the hot cells. The SAL sources that tie into this drainpipe include the hot cells, sink drain, hood drain via the sink drain, and floor drain. The cup sink drain and hood drain line is sealed off and is not in use. The drain line also functions as the tank vent that is exhausted by the hot cell exhaust system. Waste solution is pumped from the SAL tank to the RLWS by either a transfer gear pump or a water jet, both of which are located on top of the tank. Both the transfer pump and jet suction lines drop down vertically through the top head to the bottom head and are bent to the center of the tank to minimize the remaining liquid heel when transferring the liquid to the RLWS. The transfer pump is a gear pump with 30 liter per minute capacity at 9-meter water head with 1.5 meters suction head. A flow indicator/totalizer is located on the upstream process water line to be used to verify process water flow during water jet transfer operations. A second, smaller sample pump also is located above the tank. The sample pump provides for solution transfer to the sample station located just north of the tank system. The operators draw a sample at the ventilated sample hood by opening a small sample valve. The sample pump is a gear pump with 3.8 liter per minute capacity at 1.5-meter water head with 1.5 meters suction head. Both gear pumps have magnetic drives to avoid shaft leakage. The discharge piping from each pump has a pressure relief valve installed to protect the gear pumps. The discharge piping from the pressure relief valve is piped back into the tank to contain the solution. A mixer is located on top of the SAL tank to provide agitation of the contents for sampling and washout purposes. Process water also is provided to the tank system for cleanout of the tank and associated piping.

The SAL tank is located in a controlled access room and is monitored from two operating panels. The smaller sample panel is located next to the SAL tank, and the second main control panel is located in Room 201, the main operating gallery. The sample panel provides control for activities related to pulling a sample, such as activating the sample pump and controlling process water, and monitoring the liquid level of the tank. The main control panel provides the operators with the ability to monitor and control the entire SAL tank system. The main control panel provides level indication, high, and high-high level annunciation and contains switches for controlling pumps, agitators, valves, etc. The SAL tank is instrumented with three types of level-monitoring devices. Two devices are wired into the annunciator at the main control panel to provide high-level alarms, and one high-level alarm annunciates at the annunciator board in the control room on the third floor. This control room is staffed 24 hours a day, 7 days a week. If a high-alarm situation should occur after normal working hours, operations personnel would be notified immediately by the alarm and would take corrective action according to procedure. The SAL tank system normally is operated on the day shift. Personnel occupy the main operating gallery in Room 201, where the personnel would be alerted to off-normal conditions on the main control panel. A high-level alarm also would de-energize the process water solenoid valves to the closed position on three water lines into the hot cells and on the process water lines to the SAL tank. The containment pan contains a conductivity element that alarms at the main control panel should solution be detected in the pan. Operating procedures require that inspections of the entire system be made daily when in use (Chapter 6.0).

4.2.1.1.2 Integrity Assessments [D-2a(2) and D-2a(3)]

An independent, qualified, registered professional engineer's tank integrity certification has been completed and will be submitted as a separate document.

### 4.2.1.2 Secondary Containment and Release Detection for Tank Systems

This section describes the secondary containment systems and leak detection systems installed in the SAL.

4.2.1.2.1 Requirements for Tank Systems [D-2b(1), D-2b(2)(b), and D-2b(2)(c)]

The secondary containment system for the SAL Tank in Room 32 consists of two components: (1) the SAL tank is a double-walled vessel and the outer tank provides secondary containment for the inner tank; and (2) a pan has been installed under the tank to provide secondary containment for the pumps, valves, and flanges located on the top of the tank. The pan also provides tertiary containment for the tank.

The existing drainpipe from the hot cells to the SAL tank is a single-walled, 5.1-centimeter welded stainless steel pipe. This piping is visually inspected for leaks on a daily basis when the tank system is in use, by means of a remote video system. Flanges in this piping and ancillary equipment are located so that secondary containment is provided by the SAL tank secondary containment pan. For the existing RLWS, the transfer piping from the SAL tank to the RLWT is single-walled, welded stainless steel pipe from the tank to the 325 Building boundary and double-walled stainless steel pipe from the RLWS tank to the cask loading station. The RLWS system will utilize the single-walled, welded stainless steel pipe from the SAL tank to the RLWS tank, and a new double-walled stainless steel pipe will be used to transfer waste from the RLWS tank to the truck lock. New double-walled piping will also be installed to extend the drain line from Room 32 to the RLWS tank. Refer to Figure 2.3b for a schematic of the modified RLWS tank system. The welded single-walled transfer piping is visually inspected for leaks within 24 hours of a transfer. The 325 Building provides additional containment. The basement floors are concrete, and any liquid release remains in the immediate area until cleanup. The openings to the drains in the basement are elevated 10.2 centimeters above the floor; thus, any spill would remain in the basement until enough liquid collects to fill the entire basement to a 10.2-centimeter depth. The SAL tank can hold a maximum of 1,218 liters, and the entire contents of the SAL tank would fill an area of only 3.5 meters by 3.5 meters to a depth of 10.2 centimeters. Because the basement is larger than 3.5 meters square, the liquid from the SAL tank would not enter a drain opening. Details of the design, construction, and operation of the secondary containment system are described in the following sections.

4.2.1.2.2 Requirements for Secondary Containment and Leak Detection

The secondary containment has been designed to prevent any migration of waste or accumulated liquid from the tank system to the soil, groundwater, or surface water. The secondary containment system also can detect and collect releases of accumulated liquids. A zoom color television camera surveillance system allows for tank, ancillary equipment, and general Room 32 viewing. The camera, located in Room 32, is equipped with auxiliary lighting and mounted on a remote controlled pan and tilt head. The color monitor and camera controls are housed in a dedicated cabinet in Room 527 or 527A. The HWTU will have the option of either keeping the camera/monitor controls in Room 527, 527A, or moving it to another location for operational flexibility. By maintaining operational flexibility of where the camera controls are located, the HWTU can meet ALARA (As Low As Reasonably Achievable) requirements and minimize the expense of added HWTU training requirements.

The following is the system description.

Materials of construction. The tank and components are constructed of 316L stainless steel; this material is compatible with the aqueous waste being discharged to the tank. The waste has a pH between 7 and 12.

Strength of materials. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of materials is adequate and that the tank can withstand the stress of daily operation (SAIC 1996). Also, pressure relief valves are installed in each line exiting the SAL tank. In the event that there is a blockage in the pipe or tubing, pressure will not build up in the lines. The pressure relief valves are set to 30 psi, which is well below the design strength of stainless steel pipe and tubing. Waste drains back into the SAL tank when a pressure relief valve opens.

Strength of foundation. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the tank mounting and foundation is adequate to withstand the design-basis earthquake (DBE). This ensures that the foundation is capable of providing support to the tank and will resist settlement, compression, or uplift.

Leak detection system description. The SAL tank is double walled, and a conductivity probe is installed in the annulus to detect any leak of liquid from the primary containment. If liquid is detected by the probe, alarms are sounded immediately in a local control panel located in Room 32 and in the main control room.

A pan installed beneath the SAL tank provides tertiary containment. The containment pan has a conductivity element that alarms at the main control panel if the presence of liquid in the pan is detected. The containment pan has an 203-centimeter diameter and a 51-centimeter height with a containment capacity of 1,648 liters. The containment pan will easily hold the total capacity of the 1,218-liter SAL tank plus any potential process water that might be released.

Removal of liquids from secondary containment. The tank secondary containment, the outer shell of the double-walled vessel, is designed to contain a liquid leak from the inner vessel until provisions can be made to remove the liquid. The liquid might not be removed within 24 hours because of the coordination that must take place in the 325 Building. A tube is installed in the annulus that extends to the bottom and is capped at the top of the tank. If liquid were detected in the annulus, the liquid could be removed by connecting a tube between the capped fitting and the transfer pump, which would pump the liquid into the RLWS transfer line.

A delay of greater than 24 hours in removing the liquid from the secondary containment poses no threat to human health or the environment, because the waste continues to be contained in a sealed vessel. In the event that the secondary containment should leak, the containment pan installed beneath the tank provides tertiary containment.

#### 4.2.1.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the SAL tank system ancillary equipment is provided by the containment pan below the SAL tank, by double-walled piping for the sample line between the tank and the sample station, and by daily visual inspection during use of the entire system including the existing single-walled piping. Flanged and threaded connections, joints, and other connections are located within the confines of the containment pan. Outside this pan, only double-walled piping and welded piping is allowed. The pumps are magnetic coupling pumps located above the pan. All material of construction is stainless steel; for welded parts the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the SAL tank. The strength and thickness of the piping, equipment supports, and containment pan are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system is located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The containment pan has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The containment pan has a 203-centimeter diameter and a 51-centimeter height, or 1,648 liters of capacity. The containment pan will hold the total capacity of the 1,218-liter SAL tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks.

4.2.1.2.4 Controls and Practices to Prevent Spills and Overflows

The SAL tank system has been designed to account for safe and reliable operation to prevent the system from rupturing, leaking, corroding, or otherwise failing. The tank is provided with redundant-level instrumentation to monitor tank levels. Both capacitance- and conductance-level probes are used for level monitoring and alarming. The tank will alarm on high level and interlock the process water to fail close. The process water is supplied to both the hot cells and the tank system. The containment pan is equipped with a liquid-sensing element to detect the presence of liquid and alarms at the main control panel if liquid is detected. Normally, liquid is drained to the tank by operators pouring solution into the troughs in the hot cells. This operation is carried out in a "batch mode." If this operation sets off a high-level alarm, the operators stop pouring solution into the troughs. Even if this operation caused an alarm condition, no spill is expected, because the tank has sufficient freeboard to hold additional waste solution. The initial level alarm is set at 92 percent of full volume.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following guidance provided in the 325 Building Emergency Plan and the 325 HWTUs Contingency Plan (Chapter 7.0). Measures are in place to inspect the system daily.

**4.2.1.3 Tank Management Practices [D-2d]**

According to operating procedures, liquid waste is poured into the troughs. The troughs tie into the 5.08-centimeter drain header located under the hot cells. This drain header is sloped down to the SAL tank located in Room 32 of the basement. The existing drain header is the only method of introducing mixed waste solutions into this tank. The drain line is fully welded and is constructed of 316L stainless steel material. Because this drain line also serves as the SAL tank vent line, the SAL tank operates at the same pressure as that of the hot cells. The heating, ventilation, and air conditioning operating pressure for the hot cells, and therefore the SAL tank, is -1.27 centimeters water (vacuum). The SAL tank operates at slightly subatmospheric pressure, and no pressure controls are necessary for this tank system.

The SAL tank is fully monitored with tank-level instruments. A main control panel provides level status and high-alarm annunciation. Two control panels are provided with the SAL tank monitoring system. One control panel is located adjacent to the sampling station in Room 32 to control the sampling pump when samples are pulled. A second control panel is located on the operating floor in Room 201, the SAL main operating gallery. Tank status is monitored from the first floor control panel. Because waste solution is generated in a batch mode, waste solution drained to the tank is effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. A safety cutoff system for the tank will shut off all incoming water to the SAL in conjunction with a high-level-alarm condition. A backup tank system was determined to be unnecessary for the SAL operations because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

The tank transfer controls provide similar safety features. Once the SAL tank contains sufficient volume, the tank's solution is prepared for transfer to the RLWS. After waste characterization is completed, the transfer to the RLWS is initiated by following internal TSD procedures. Once started, the transfer continues until a low-level condition automatically stops the transfer pump or until it is stopped by operator action. The solution can be transferred to the RLWS by either the transfer gear pump or by the water jet. Currently, the RLWS piping is a 316L stainless steel single-walled pipeline inside the basement from the SAL tank to the RLWT. Piping from the SAL tank to the RLWS tank will be single-walled 316L stainless steel, while the piping from the RLWS tank to the truck lock will be double-walled 316L stainless steel.

#### 4.2.1.4 Marking or Labeling [D-2e]

Due to the high radiation levels associated with the SAL tank, the tank itself is not labeled. The tank is located in a locked room to prevent unnecessary radiation exposure. Access points to the room are labeled to meet the requirements of WAC 173-303-395. The marking of the access points is legible from a distance of 15 meters and identifies the waste. The label adequately warns employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the tank. The tank also has a written placard identifying important radioactivity, criticality, and hazard concerns.

#### 4.2.1.5 Ignitable, Reactive, and Incompatible Waste [D-2h]

Many different types of samples and waste materials will be brought to the SAL hot cells for analytical or research activities. These samples are accompanied by an internal PNNL documentation form that provides waste characterization information from the sample-generating unit. Chemical characterization provided in these forms is based on previous chemical analysis or process knowledge. The hazard potential includes exposure to radiation, corrosive chemicals, and hazardous chemicals. All operations performed in the SAL hot cells are conducted by qualified operators following approved procedures. Typical hot cell analytic processes generate liquid waste that is highly acidic and/or that have a high chloride level. A small quantity of organic waste is generated and segregated prior to treatment or disposal. If heavy metals are present in the liquid waste before neutralization, the metals are precipitated as hydroxides incident to the neutralization and are filtered from the solution. If the chloride content of the liquid is above 0.01 Molar, the chlorides may be removed through silver nitrate precipitation. Therefore, waste solutions are not expected to be ignitable, reactive, or incompatible when transferred to the SAL tank.

The following factors will ensure a safe and reliable tank system with regard to ignitable, reactive, and incompatible waste: the tank system operates at ambient temperatures and pressures; all waste added to the tank meets the RLWS waste acceptance criteria; the tank construction material is stainless steel; and the operators are trained in the applicable procedures and have past operating experience.

### 4.2.2 Radioactive Liquid Waste Tank (RLWT) System

The Radioactive Liquid Waste Tank (RLWT) system consists of a 11,355 liter waste tank in the basement of the 325 Facility, and piping from Room 52 and the SAL Hot Cell Facility. The RLWT system is intended for the management and disposal of high dose and difficult to manage aqueous waste. After collection in the RLWT, the waste is transferred to a shielded transportation cask and shipped to the double shell tanks in the 200 Area. The 325 Facility is expected to continue to generate approximately 5,678 to 7,570 liters of radioactive liquid waste each year. The RLWT sits below the basement floor in a tank pit.

#### 4.2.2.1 Design, Installation, and Assessment of Tank Systems [D-2a]

The following sections discuss the design of the RLWT system. Information on the integrity assessment was provided in accordance with WAC 173-303-640 and 810.

##### 4.2.2.1.1 Design Requirements [D-2a(1)]

The RLWS tank is constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank. Waste in the RLWT will be treated or reacted, if needed, to protect the tank integrity.

The RLWT system design was reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation before operations began. The professional engineer's evaluation is included in the tank integrity assessment.

The RLWT is a vertical single-shell tank supported by multiple legs and stand approximately 2.4 meters in height and 2.4 meters in diameter. The tank has a welded construction of 316L stainless steel and sit approximately 15.2 centimeters above the floor in the tank pit with a formed bottom to minimized a heel in the tank. The tank is located inside a concrete pit below the basement floor. The tank pit is lined with a stainless steel liner on the floor and approximately 0.6 meters up the walls to allow for a secondary containment capacity of at least 100% of the tank. Sealant was placed along the walls at the end of the liner, and the remaining portion of the concrete pit walls were painted with a chemically resistant coating. A concrete shielding cover was placed over the pit. A tank control room constructed of steel studs and gypsum is located on the west side of the tank pit.

The primary tank control panels are located in the control room, and secondary control panels are located in the truck lock, Room 601, Room 201, and in the operator's office. Conductivity probes are installed in the tank at 305-mm intervals. Signals from the probes indicate the liquid level in the tank by signal lights on all control panels. Other signals from the conductivity probes alarm high liquid level by a signal light on each control panel plus sound on the panel in the operator's office.

Liquid waste enters the RLWT through gravity flow piping. A mixing pump provides agitation of the tank contents. Mixing pump system controls are installed on the control panel in the control room.

Samples will be collected prior to transferring the waste from the RLWS tank to the DST System. A sampling pump and recirculating loop was installed on the tank. A small sample hood is located in the control room. Controls for the sample hood are located near the sample hood. This hood is connected to the HEPA filtered exhaust system.

4.2.2.1.2 Integrity Assessments [D-2a(2) and D-2a(3)]

An independent, qualified, registered professional engineer's tank integrity certification was completed and provided to Ecology before the tank system begins operation.

### 4.2.2.2 Secondary Containment and Release Detection for Tank System [D-2b]

This section describes the secondary containment systems and leak detection systems installed in the RLWT system.

4.2.2.2.1 Requirements for Tank Systems [D-2b(1), D-2b(2)(b), and D-2b(2)(c)]

The secondary containment system for the RLWT consists of the stainless steel liner in the bottom of the concrete tank pit and 0.6 meters up the tank pit walls. The remaining portion of the concrete walls are painted with a chemically resistant coating and the boundary between the steel liner and the coating is sealed.

The welded single-walled transfer piping will be visually inspected for leaks within 24 hours of a transfer. The 325 Building provides additional containment. The basement floors are concrete, and any liquid release remains in the immediate area until cleanup.

The transfer piping from the SAL tank to the RLWT is single-walled, welded stainless steel pipe. Sections of the RLWT system piping has secondary containment where feasible. Secondary containment for the piping system consists of double-walled stainless steel pipe with outlet valves at the ends. Secondary containment piping was installed on the new line from Room 40A to the RLWT. Secondary containment piping was also installed on the line between Room 528 and the RLWT and from the RLWT to the cask loading station. Any leaks in the primary piping will cause liquid to gravity flow to the area of the pipe containing the outlet valve. An increase in radiological dose will be seen if liquid is collecting in the annulus.

4.2.2.2.2 Requirements for Secondary Containment and Leak Detection

The secondary containment was designed to prevent any migration of waste or accumulated liquid from the tank system to the soil, groundwater, or surface water. The secondary containment system is able to detect and collect releases of accumulated liquids. Remote television cameras provide a surveillance system for the RLWT, ancillary equipment, and general viewing of the tank pit. Viewing screens and controls are located in the control room. The following is the system description based on conceptual design.

<u>Materials of construction.</u> The RLWT and components are constructed of 316L stainless steel; this material is compatible with the aqueous waste being discharged to the tank. The waste has a pH between 7 and 12, and the chloride ion concentration averages less than 0.01 Molar.

<u>Strength of materials.</u> The system design was reviewed by an independent, qualified, registered professional engineer to verify that the strength of materials is adequate and that the tank can withstand the stress of daily operation before operations began.

<u>Strength of foundation.</u> The system design was reviewed by an independent, qualified, registered professional engineer to verify that the strength of the tank mounting and foundation is adequate to

withstand the Design Basis Earthquake (DBE) before operations began. This ensures that the foundation is capable of providing support to the tank and will resist settlement, compression, or uplift.

<u>Leak detection system description.</u> Conductivity probes are installed inside the single-walled tank to detect the liquid level in the tank. Any leaks from the tank will be collected in the stainless steel lined tank pit. Liquid sensing tape is installed in the bottom of the tank pit to detect any leak of liquid from the primary containment. If liquid is detected, alarms will sound immediately in a local control panel and in the operator's room.

<u>Removal of liquids from secondary containment.</u> The RLWT secondary containment, the lined tank pit, is designed to contain a liquid leak from the tank until provisions can be made to remove the liquid. The liquid might not be removed within 24 hours because of the coordination that must take place in the 325 Building and the DST personnel. A dip tube installed in the tank pit extends from the bottom of the pit to the outside of the vault and is capped at the top. If liquid were detected in the tank pit, the liquid will be removed by connecting a transfer pump to the dip tube. Any liquid removed from the secondary containment would be transferred to the DSTs in a manner consistent with the transfer of waste from the RLWT to the DSTs.

A delay of greater than 24 hours in removing the liquid from the secondary containment poses no threat to human health or the environment, because the waste continues to be contained in the tank pit.

#### 4.2.2.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the RLWT system ancillary equipment will be provided by the lined tank pit, double-walled piping, and daily visual inspection during use of the entire system including the existing single-walled piping. All material of construction will be stainless steel; for welded parts the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the tank. The strength and thickness of the piping, equipment supports and secondary containment are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system is located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The tank pit has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The tank pit will hold the total capacity of the 11,355-liter tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks.

#### 4.2.2.2.4 Controls and Practices to Prevent Spills and Overflows

The RLWT system has been designed to account for safe and reliable operation to prevent the system from rupturing, leaking, corroding, or otherwise failing. The tank is provided with redundant-level instrumentation to monitor tank levels. Conductance-level probes are used for level monitoring and alarming as well as a secondary tank level monitoring system. The tank will alarm on high level and interlock the process water to fail close.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following guidance provided in the 325 Building Emergency Plan and the 325 HWTUs Contingency Plan (Chapter 7.0). Measures are in place to inspect the system daily.

#### 4.2.2.3 Tank Management Practices [D-2d]

The RLWT was installed in an existing pit in the basement, entirely below grade. The top of the tank is shielded by a concrete deck on top of the pit. The deck is constructed of multiple stepped cover blocks to simplify installation/removal.

The single wall vertical tank is supported by multiple legs. Secondary containment is provided by lining the lower portion of the tank pit. The stainless steel liner is sealed to the pit wall, and the wall above the liner will be coated with a chemical-resistant material. The tank is operated near atmospheric pressure and vented through HEPA filters.

The primary panel in the control room is adjacent to the tank pit. Other Liquid level monitoring panels are located in Room 601, 325A truck lock, Room 201, Room 527 and the power operator's office. The tank is monitored with two liquid level instruments, and meters/indicating lights are provided in all control panels. Several of the panels have high liquid level alarms. These alarms are audible or visual, depending on location.

There is a leak detection system for the double walled piping and the tank pit liner. Liquid sensing cable is connected to alarms in the operator's office. There are remotely operated TV cameras in the pit to inspect the tank and the liner. These cameras will be viewed by operators when performing the daily inspection of the tank for evidence of corrosion and releases of dangerous waste.

Because liquid waste is generated in a batch mode, waste drained to the RLWT will be effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. When there is an alarm, a safety cutoff system will shut off all incoming process water lines.

A backup tank system was determined to be unnecessary because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

Liquid waste will be transported from 325 Building to DSTs using the cask system. The 325A truck lock has been modified to handle the cask system. There is a transfer line with secondary containment in 325 Building between the tank and the truck lock. A pump is used to transfer the waste from the RLWT to the truck lock.

Prior to transferring waste from the RLWT, responsible personnel will schedule the cask system for a waste transfer. A small quantity of waste will be obtained for characterization using a sample pump and small hood. The cask system will be positioned in the 325A truck lock. Transfer of the waste to the cask system will be performed in accordance with 325 Building and approved cask system procedures.

#### 4.2.2.4 Marking or Labeling [D-2e]

Due to the high radiation levels associated with the RLWT, the tank itself is not labeled. The tank is located below grade in a sealed pit. Access points to the tank pit are labeled to meet the requirements of WAC 173-303-395. The marking of the access points is legible from a distance of 15 meters and identifies the waste. The label will adequately warn employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the tank. The RLWT also has a written placard identifying important radioactivity, criticality, and hazard concerns.

#### 4.2.2.5 Ignitable, Reactive, and Incompatible Waste [D-2h]

Many different types of samples and waste materials will be brought to the SAL hot cells, and the HWTU. These samples are accompanied by an internal PNNL documentation form that provides waste characterization information from the sample-generating unit. Chemical characterization provided in these forms is based on previous chemical analysis or process knowledge. The hazard potential includes exposure to radiation, corrosive/flammable chemicals, and hazardous chemicals.

Prior to transferring wastes to the RLWT system, the wastes are evaluated to ensure compatibility with the system and to preclude introduction of flammable or reactive waste in order to protect the integrity of the new RLWS tank. The RLWT system is equipped with treatment capabilities including neutralization and chloride removal. These treatment systems include chemical additive tanks and a tank agitator.

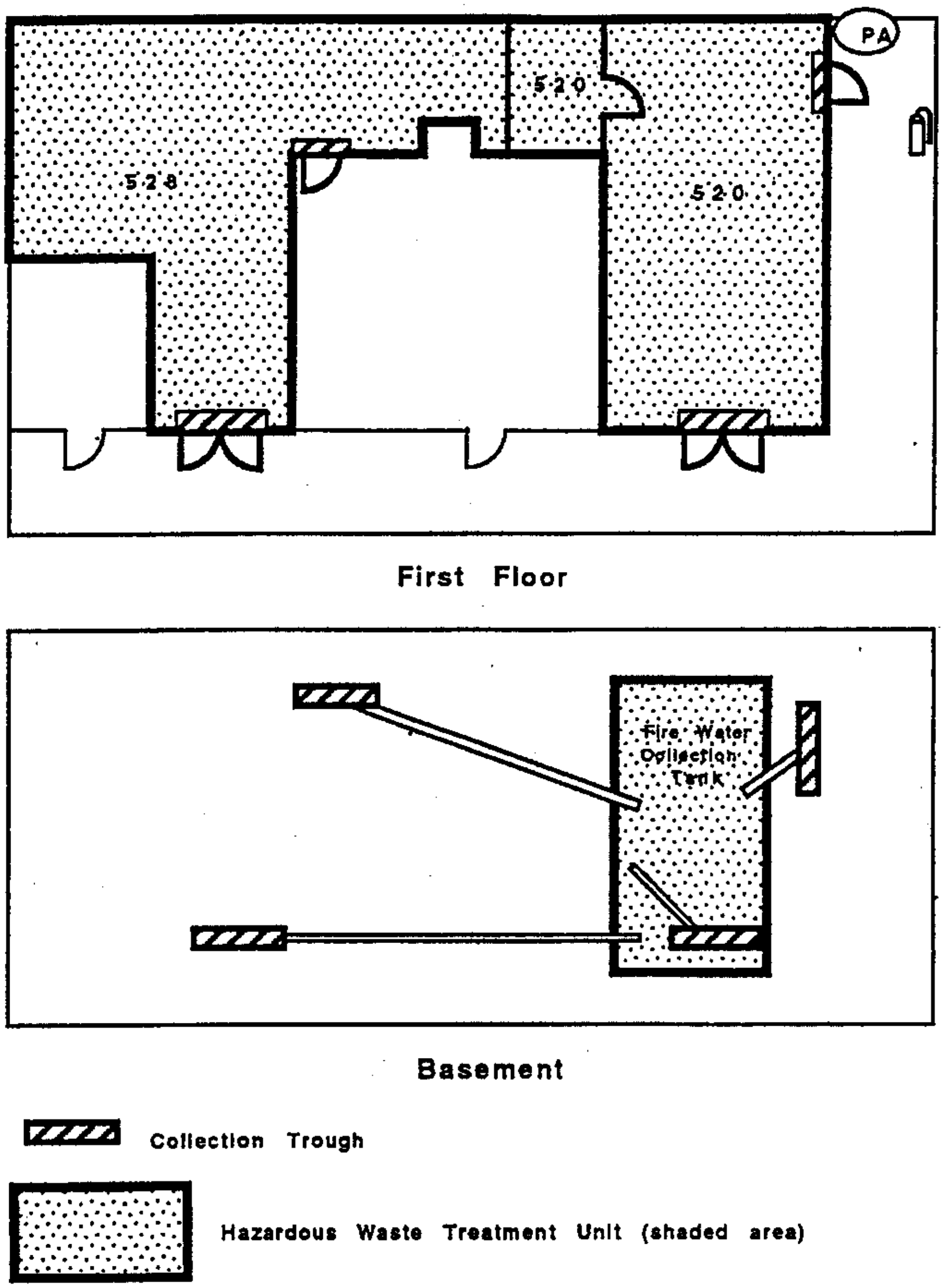
Based on analytical results and process knowledge of the 325 laboratories generating the waste, treatment of the SAL generated waste prior to discharge, and agitation and treatment capabilities in the RLWT, waste solutions are not expected to be ignitable, reactive, or incompatible.

The following factors will ensure a safe and reliable tank system with regard to ignitable, reactive, and incompatible waste: the tank system operates at ambient temperatures and pressures; all waste added to the tank meets the RLWS waste acceptance criteria; the tank construction material is stainless steel; and the operators are trained in the applicable procedures and have past operating experience. Closure of the RLWT is addressed in Section 11.4.

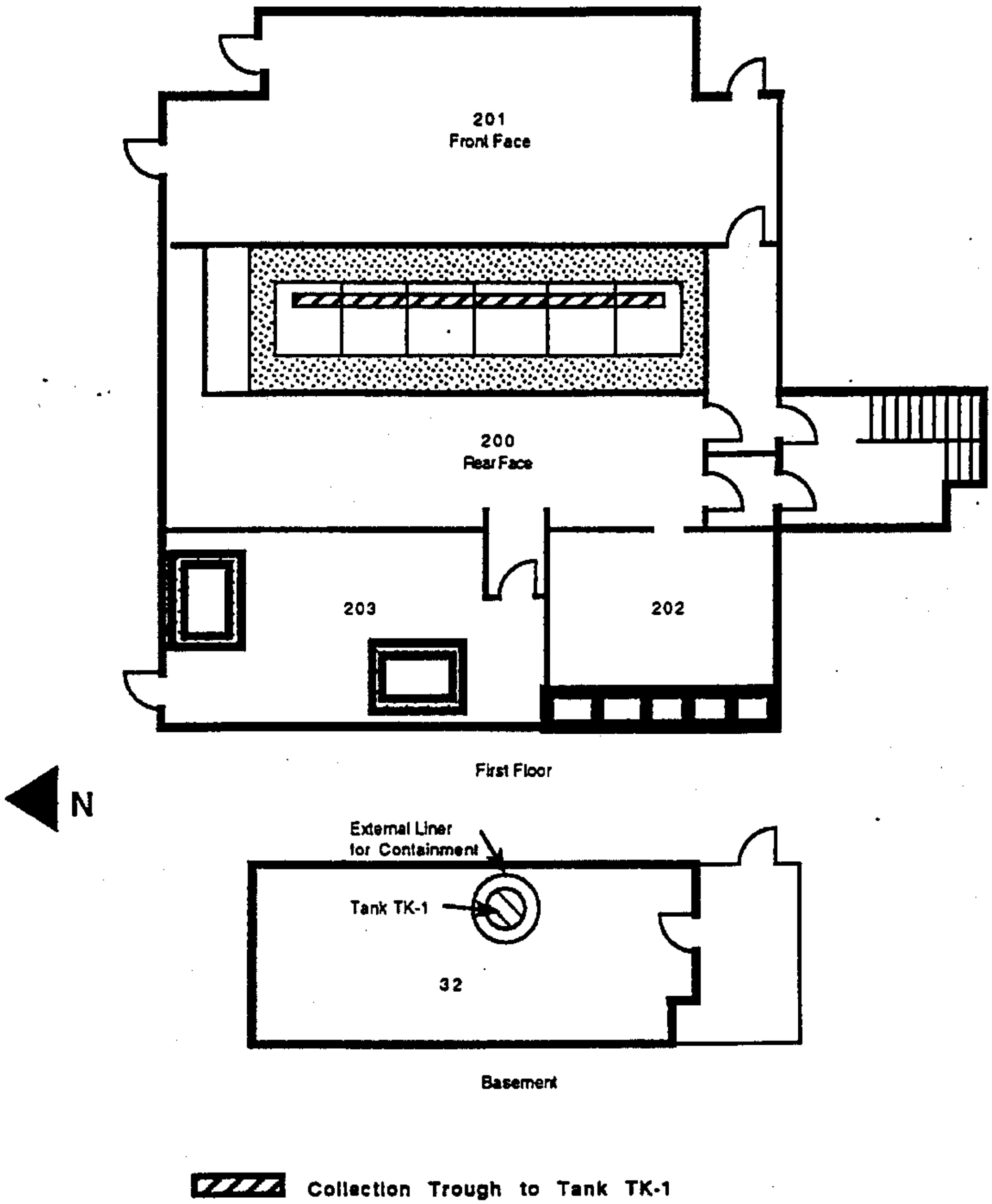
## 4.3 AIR EMISSIONS CONTROL [D-8]

The air emissions standards on 40 CFR 265, Subpart AA and BB do not apply to any part of the 325 HWTUs. Containers in the 325 HWTUs are primarily managed as mixed waste. Such containers are exempt from 40 CFR 264, Subpart CC by 40 CFR 264.1080(6).

**Figure 4-1. Hazardous Waste Treatment Unit Secondary Containment System.**



1 **Figure 4-2. Hot Cell Secondary Containment System.**




2

**Table 4-1. Typical Storage Containers Used at the 325 Hazardous Waste Treatment Units.**

| Material of construction | Waste Capacity |
|---|---|
| Glass container/bottles | 1 milliliter to 3.79 liters |
| Plastic containers/bottles | 1 milliliter to 19 liters |
| Paint cans | 0.47 liters to 4.73 liters |
| Steel containers | 114 liters, 322 liters |
| Plastic-lined steel containers | 114 liters, 208 liters |
| Steel "shielded" 208-liter container | Various nominal capacity depending on necessary shielding; 3.79 liters; 53 liters |
| Overpack containers | 322 liters |

# 6.0 CONTENTS



## FIGURES



## TABLE

# 6.0 PROCEDURES TO PREVENT HAZARDS [F]

The 325 HWTUs are operated to minimize exposure of the general public and operating personnel to dangerous wastes.

## 6.1 SECURITY [F-1]

The following sections describe the security measures, equipment, and warning signs used to control entry to the 325 HWTUs.

### 6.1.1 Security Procedures and Equipment [F-1a]

The following sections describe the 24-hour surveillance system, barrier, and warning signs used to provide security and control access to the 325 HWTUs.

#### 6.1.1.1 24-Hour Surveillance System [F-1a(1)]

The entire Hanford Facility is a controlled access area [refer to General Information Portion (DOE/RL-91-28)].

#### 6.1.1.2 Barrier and Means to Control Entry [F-1a(1)(a), (1)(b)]

The entire 300 Area is surrounded by a 2.4-meter chain link fence topped with three strands of barbed wire. There is no separate fence surrounding the 325 Building.

Entry to the 325 Building is indirectly controlled at all entry points to the 300 Area. Both active and passive controls are in place. Trespass warning signs are posted at all entry points. The Hanford Patrol periodically spot checks traffic entering the 300 Area. Entry to the 325 Building is controlled through the use of locked entrances with contact of 325 staff required for building access. The 325 HWTUs also are kept locked at all times. PNNL Security maintains access and access records to the 325 HWTUs. The BED or designee has access to the 325 HWTUs and can provide access in an emergency. Personnel in possession of keys have been instructed to admit only persons having official business. All visitors to the 325 HWTUs must be escorted by HWTUs personnel.

Personnel have pedestrian access to the 325 Building through multiple pedestrian gates. For access, all persons must have a valid U.S. Department of Energy-Richland Operations Office (DOE-RL) security badge or temporary badge with proper escort. There is no general, authorized public access to the 325 Building.

#### 6.1.1.3 Warning Signs [F-1a(2)]

Signs bearing the legend "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT," or an equivalent legend, are posted at each entrance of the 325 HWTUs. The signs are in English, legible from a distance of 7.6 meters, and visible from all angles of approach. In addition to these signs, the fence around the 300 Area is posted with signs, printed in English, warning against unauthorized entry. These signs are also visible from all angles of approach.

### 6.1.2 Waiver [F-1b]

Waiver of the security procedures and equipment requirements for the 325 HWTUs are not requested. Therefore, the waiver requirement outlined in WAC 173-303-310(1)(a) and (b) are not applicable.

## 6.2 INSPECTION PLAN [F-2]

The purpose and intent of implementing inspection procedures at the 325 HWTUs are to prevent malfunctions, deterioration, operator errors, and/or discharges that might cause or lead to the release of regulated waste to the environment or threats to human health. A system of daily, weekly, and monthly, inspections involving various PNNL departments and levels of management has been implemented at the 325 HWTUs. The Hanford Facility 300 Area Fire Department performs a once-every-four months inspection of the fire suppressant and notification systems and annually an inspection of the sprinkler systems.

### 6.2.1 General Inspection Requirements [F-2a]

The content and frequency of inspections performed at the 325 Building are described in this section. Also described is maintenance of inspection records.

Observations made and deficiencies and corrective actions noted during an inspection are recorded on the inspection checklist. The checklist includes the inspector's printed name, signature, date, and time. Once approved, the checklist is kept in 325 HWTUs files. The inspection records and dates are used to help determine any necessary corrective actions. Problems identified during the inspections are prioritized and addressed in a timely fashion as appropriate to mitigate health risks to workers, and to maintain integrity of waste management units.

#### 6.2.1.1 Types of Problems [F-2a and F-2c]

Daily, weekly, monthly, quarterly, once every four months, and annual inspections are performed at the 325 HWTUs. The types of problems addressed by each of these inspections are described as follows.

**Daily Inspections.**

The 325 HWTUs staff performs daily inspections whenever waste packaging, transfer, shipping, or movement operations are conducted. HWTU personnel monitor container condition and integrity, the building waste containment system, and other building areas daily where waste is handled. Specific inspection points include, but are not limited, to the following:

- Container integrity
- Mislabeled or opened containers
- Improper storage (e.g., incompatible waste storage)
- Disorderliness or uncleanliness of storage unit
- Accumulation of waste in containment systems.

Results of these daily inspections are documented as part of the 325 HWTUs operating record.

**Weekly Inspections.**

The 325 HWTUs personnel conduct weekly inspections of both safety and operating equipment in the 325 HWTUs. Safety and emergency equipment are inspected for functionality and adequacy of supply. The weekly inspection usually is conducted on or before the last workday of each week and covers the same inspection points as the daily inspections (Section 6.2.1.1.1). Results of these weekly inspections are documented as a part of the 325 HWTUs operating records.

**Monthly Inspections.**

325 HWTU's line management or their designees conduct monthly oversight inspections. These monthly inspections are conducted on or near the last workday of each month. Items targeted for monthly inspections include, but are not limited to, equipment function and condition, housekeeping, chemical inventory, weekly inspections and corresponding corrective actions, safety equipment operation, spill control and cleanup supplies, and general packaging material inventory. Inspection reports are part of the 325 HWTUs operating records.

**Quarterly, Once Every Four Months, and Annual Inspections.**

The Hanford Facility 300 Area Fire Department performs a once-every-four-months inspection of fire suppressant and notification systems (i.e., sprinkler system and fire alarm pull boxes). This inspection includes flow tests of the sprinklers to ensure that there is no blockage in the system lines; the alarm system is activated to ensure proper pull box operation. Annually, the Fire Department performs a full inspection of the sprinkler system, smoke detectors, heat detectors, and pull boxes. A complete flow test of the sprinkler system is performed from the furthest valve to ensure proper flow through the entire system. Fire extinguishers also are checked for proper pressure and function. Records of these fire inspections and the Hanford Fire Department retains their results.

Additional documented inspections are performed quarterly of the emergency eyewash/shower units, the fume hoods, and other ventilation system components. Records of these safety equipment inspections and the results, as well as documentation of any required corrective actions, are maintained by the appropriate facilities and operations staff.

#### 6.2.1.2 Frequency of Inspections

The frequency of inspections is based on specific regulatory requirements and on the rate of possible deterioration of equipment and probability of environmental or human health incidents.

Areas where dangerous and mixed waste are actively handled, including all of the hot cells, the front and back face of the SAL, Rooms 520 and 528 in the HWTU, and the visible single wall transfer piping associated with the RLWS are considered to be areas subject to spills. These areas are given daily inspections when in use as required by WAC 173-303-320(2)(c).

The primary and secondary containment systems (i.e., floors, troughs, and sumps) are inspected daily when in use for accumulation of spilled material. The containment systems are inspected weekly for structural integrity (i.e., no cracks, gaps, leaks that could result in environmental release of wastes in the event of a spill). This frequency is based on the need to perform timely corrective actions in the event that problems are noted.

Aisle space between containers is inspected weekly when applicable. As the objective of the aisle space requirements is to allow for unobstructed movement of personnel and equipment in case of an emergency, the aisle space requirements do not apply to the hot cells, shielded cubicles, or storage cabinets. If quantities of waste are packaged in large containers or drums, temporarily stored before a transfer, a minimum aisle space of 76 centimeters is maintained in accordance with WAC 173-303-340(3), As-Low-As-Reasonably-Achievable (ALARA) concerns, and with applicable standards of the Uniform Building Code and Life Safety Code. Weekly inspections, where applicable, allow container spacing problems to be identified and corrected.

Emergency and safety equipment and personal protective equipment are inspected weekly. Weekly inspections will assure this equipment is available and in adequate supply.

### 6.2.2 Specific Process Inspection Requirements [F-2d]

The following sections detail the inspections to be performed at the 325 HWTUs.

#### 6.2.2.1 Container Inspection [F-2d(1)]

Dangerous and mixed waste containers stored in the 325 HWTUs are inspected daily where waste handling activities are performed for leakage, evidence of damage or deterioration, proper and legible labeling, and proper lid and bung closure. Any observations made during the inspections, including any repairs or remedial actions taken, are documented in the logbook with the date, time, and printed name and signature of the inspectors. This logbook is maintained in the 325 HWTUs for at least 5 years from the dates of the inspections. All areas subject to spills are inspected daily when in use. Structural integrity of the containment systems is checked weekly.

#### 6.2.2.2 Tank System Inspection [F-2d(2)]

The Shielded Analytical Laboratory (SAL) tank located in Room 32 is used to store mixed waste generated as a result of waste treatment activities. The RLWT located in the 325 basement tank pit is used to store mixed waste discharged to the RLWS from the SAL tank, the HWTU, and slab tanks in Room 40. Routine inspections of the SAL tank system and the RLWT system are conducted in accordance with WAC 173-303-640. Routine inspections of the RLWT system are conducted in accordance with WAC 173-303-640. Inspections involve a combination of visual, mechanical, and electronic means. Due to ALARA considerations, visual inspections of the tank system are conducted by remotely operated cameras mounted in Room 32 and the tank pit. These visual inspections are limited to areas of the tank system that can be observed by the camera. A very small portion of an RLWS line associated with the SAL tank system is not directly visible via the camera system, but is inspected indirectly with the camera using a mirror, and during periodic entries into Room 32. A logbook or inspection sheet of all inspections is maintained in the operating record for at least 5 years from the date of the inspection.

**Tank System External Corrosion and Releases.**

Aboveground portions of the SAL tank and the RLWT system are inspected each operating day to detect corrosion or releases of waste.

**Tank System Construction Material and Surrounding Area.**

The SAL tank is double-walled and constructed of corrosion-resistant stainless steel, with a capacity of 1,218 liters. The secondary wall is a cylindrical stainless steel tank that provides secondary containment sufficient to contain 100 percent of the inner tank volume. The construction materials of the tank and the area immediately surrounding the externally accessible portion of the tank system, including the secondary and tertiary containment systems, are inspected during use to detect erosion or signs of releases of mixed waste (e.g., wet spots).

The RLWT is single-walled and constructed of corrosion- resistant stainless steel with a capacity of approximately 11,355 liters. The tank is lined with stainless steel providing secondary containment sufficient to contain a minimum of 100 percent of the tank volume. The stainless steel liner is sealed to the pit wall, and the wall above the liner is coated with a chemical-resistant material. The construction materials of the tank and the area immediately surrounding the tank system, including the secondary containment systems, are inspected by remote cameras during use to detect erosion or signs of releases of mixed waste.

Any deteriorations or malfunctions observed during inspection of the tank systems will be corrected. As applicable, any release to the environment is reported within 24 hours to Ecology, as identified in WAC 173-303-640(7)(d)(ii); and to the National Response Center, as identified in 40 CFR 302 for any detected leaks.

**Tank System Overfilling Control Equipment.**

The tank controls for the SAL tank include two high-level alarm systems that respond to overfill conditions. The initial tank high-level alarm is activated by a conductivity probe, the second by a capacitance probe. The conductivity probe high-level alarm and associated functions can be tested electrically by depressing a button on the main control panel in Room 201. Activation of this alarm results in a visible red light and audible alarm on the main control panel in Room 201, an alarm condition on the annunciator panel on the second floor of the 325 Building, and closure of electric solenoid valves on all inlet water supply lines to the hot cell area and tank system. Activation of the capacitance probe alarm results in a red light and audible alarm.

The tank controls for the RLWT include conductivity probes that measure the liquid level inside the tank. Liquid sensing cable is located in the lined tank pit to detect any liquid in the secondary containment.

**Tank System Monitoring and Leak Detection Equipment.**

The leak detection conductivity probe for the SAL tank is located between the primary and secondary shells of the double-walled tank. The leak detection probe signal activates if any liquids collect in the annulus between the two walls of the tank. The leak detection probe can be functionally tested electrically by depressing a test button on the main control panel in Room 201. Leaks in the RLWT are detected by liquid sensing cable. Liquid sensing cable is located in the stainless steel lined tank pit to detect any liquid in the secondary containment that may have leaked from the tank. The liquid sensing cable circuits can also be tested from the control room.

### 6.2.3 Inspection Log [F-2b]

Copies of the completed inspection checklists are provided to operations personnel and maintained in the 325 HWTUs files. Any corrective actions noted or deterioration or malfunctions in equipment discovered by the inspector are delegated to responsible individuals in the operations group. Corrective actions identified must be completed within 2 weeks unless there is documentation and reason for further delay. Examples of problems that could be identified and the corresponding remedial action are listed in Table 6.1. Inspection reports and corrective action response documentation are retained at the 325 HWTUs for a minimum of 5 years.

## 6.3 PREPAREDNESS AND PREVENTION REQUIREMENTS [F-3]

The following section documents the preparedness and prevention measures taken at the 325 HWTUs.

### 6.3.1 Equipment Requirements [F-3a]

The following sections describe the internal and external communications and emergency equipment in use at the 325 HWTUs.

#### 6.3.1.1 Internal Communications [F-3a(1)]

Internal communication systems are used to provide immediate emergency instruction to personnel in the 325 HWTUs. Internal communications address general emergencies that might occur in the 300 Area and the 325 Building, as well as specific emergencies that might occur. Personnel have access to these internal communication devices whenever waste is handled.

Because of the nature of activities that occur in the 300 Area, the potential exists for emergencies outside of the 325 HWTUs (e.g., criticality) that could impact operations and personnel. Fire alarm signals are located in each building throughout the 300 Area. The nearest emergency siren for "area evacuation" and "take cover" is located approximately 46 meters northwest of the 325 Building on top of the 326 Building and is audible in all parts of the 325 Building. Numerous criticality howlers (horns) are located throughout the 325 Building and are audible in all parts of the building.

Internal communications to provide emergency instruction in the event of an emergency in the 325 HWTUs and in the 325 Building are fire alarms, radiation alarms, differential pressure alarms (for the SAL), a differential pressure alarm in the glovebox in Room 528, leak detection alarms (for the SAL), a building-wide public address (PA) system, an intercom system (for the SAL), and telephones.

The fire alarms are used to provide notification for immediate evacuation of the 325 Building. The fire alarms are initiated on activation of the manual pull boxes, heat detectors, and the sprinkler system. Fire alarm pull boxes are located as indicated in Figures 6.1 and 6.2. Radiation and air monitoring systems with alarms are located in the 325 HWTUs. The PA system is used for building-wide broadcasting of verbal emergency instructions to 325 Building personnel. The telephone system is used to provide verbal emergency instructions to 325 HWTUs personnel. The telephones also can be used to verbally transmit emergency information to personnel outside of the 325 HWTUs and to request emergency services. A network of telephones is provided throughout the 325 Building. Locations of telephones within the 325 HWTUs are shown in Figures 6.1 through 6.3. In addition to the telephone communication system, personnel have access to hand-held radios. The radios are available from the Building Manager. All of the radios transmit at the same frequency and are capable of summoning the PNNL Single-Point Contact in case of an emergency (DOE/RL-93-75).

Hazardous Waste Treatment Unit

There are two fire alarm pull boxes in the vicinity of the HWTU; one is located in the hall north of the entrance to Room 528, and one is in the hallway just east of the south entrance to Room 520. Rooms 520 and 528 are provided with smoke detectors that, upon activation, initiate the fire alarm system and close dampers between the two rooms and the corridor. Heat detectors are provided in the glovebox in Room 528. There are two fire alarm bells just outside the HWTU. These fire alarm bells are located north of the entrance to Room 528 in the hall and east of the south entrance to Room 520 in the hall.

Additionally, a fire alarm strobe is installed in Room. The locations of the fire pull boxes are shown in Figure 6.1.

An alpha radiation monitor, located near the glovebox in Room 528, is continually in use. When airborne contaminants or alpha radiation is detected, each of these monitors sounds a local alarm.

The glovebox in Room 528 is equipped with a differential air pressure alarm that monitors the glovebox for loss of negative pressure. If a loss occurs, a local alarm is sounded.

The PA system speakers are located in Rooms 520 and 528.

Shielded Analytical Laboratory

There are four fire alarm pull boxes provided in the SAL; three are in Room 201, and one is in Room 203. Additionally, a fire alarm pull box is located just outside of Room 32. Heat detectors are provided in the six large interconnected hot cells in the SAL. Several fire alarm bells are located throughout the

325 Building, including two fire alarm bells within the SAL (one each in Rooms 201 and 203). These alarms are audible at all locations within the SAL. The locations of the fire alarm bells are shown in Figure 6.2.

The SAL is equipped with a beta continuous air monitor, which sounds a local alarm if airborne beta contamination is detected outside of the hot cells. Additionally, the SAL is provided with an area radiation monitor. If the radiation level outside of the hot cells reaches a set point, a local alarm sounds to alert personnel.

The six interconnected hot cells in the SAL are equipped with a differential air pressure alarm that monitors the hot cells for loss of negative pressure. If a loss occurs, a local alarm is sounded.

A cable leak-detection system is installed in Room 200. The cable runs behind the back wall of all six hot cells. Liquid escaping from the hot cells on the rear face (Room 200) would contact the cable and automatically sound an alarm device in Room 201. This conductivity cable runs from the hot cells to the tertiary containment pan for the SAL tank in Room 32. Any release of the tank system contents to this pan, which contacts the cable, initiates the cable leak-detection alarm.

The SAL tank is equipped with a conductivity probe for leak detection within the annulus of this double-shelled tank. The tank also is equipped with a high-liquid-level alarm. In the event of an interstitial leak or overfilling, audible alarms sound at the SAL tank's main control panel in Room 201.

The PA system speakers are located in Rooms 200, 201, and 203. An intercommunication system supplies two-way voice communications between Rooms 32, 200, 201, and 201a.

There one fire alarm pull box in the vicinity of the RLWT control and mechanical areas, located on the north wall near the south basement exit. There is one fire alarm bell just outside the control room and one just outside the emergency exit for the mechanical room.

There are 3 area radiation monitors: one directly above the tank vault, one in the control room, and one in the mechanical room. When general area radiation dose rises above a predetermined set point of the alarm these monitors sounds a local alarm.

There is leak detection cable in the tank vault, the mechanical room, and at the point where transfer piping enters the tank vault. If the cables contact moisture, a local alarm is activated as well as an alarm on the Utility Operator's annunciator panel.

#### 6.3.1.2 External Communications [F-3a(2)]

As mentioned in Section 6.3.1.1, a fire alarm system and telephone network system are in place at the 325 HWTUs. Both systems can be used to summon emergency assistance. The fire alarm system summons direct response from the 300 Area Fire Station. The telephone system can be used to access the PNNL Single-Point Contact directly by dialing 375-2400 or by dialing the emergency number 911. For DOE-RL and other non-PNNL contractor personnel dialing 911 from onsite phones, the call goes directly to the Hanford Patrol, which calls the PNNL Single-Point Contact. Locations of fire alarm pull boxes and telephones are given in Figures 6.1 through 6.3. Personnel on the premises have access to these external communication devices.

#### 6.3.1.3 Emergency Equipment [F-3a(3)]

Emergency equipment available for trained 325 HWTUs personnel includes portable fire extinguishers, a fire suppression system, spill response equipment, and decontamination equipment.

With the exception of the hot cells, the entire building also is equipped with automatic sprinkler protection consisting of Schedule 40 steel pipe per ASTM A120 (ASTM 1991) and 150-pound malleable iron fittings per ANSI B16.3 (ANSI 1992). All components are UL-listed or FM-approved. The fire sprinkler system was designed and installed in accordance with NFPA 13 for "ordinary hazard" (NFPA 1996).

Absorbent pillows are capable of absorbing small quantities of spilled inorganic and organic liquids and can be used to contain temporarily any spills of these materials. Their rated absorption capacities range from 250 to 4,000 milliliters.

Mercury spill kits are capable of cleaning up to 25 milliliter of spilled mercury. Acid, caustic, and solvent spill kits contain the materials necessary to clean up small spills of acids, bases, and organic solvents. The absorbent kits in the SAL contain absorbent pads and other materials needed to temporarily contain and clean up small chemical spills.

The appropriate spill kits can be applied, respectively, to small acid and base spills for neutralization during cleanup efforts. The caustic neutralizer has similar capabilities for neutralizing small quantities of spilled bases. If needed, the Hanford Fire Department provides additional emergency equipment.

Hazardous Waste Treatment Unit

Two portable 4.5 kilogram ABC fire extinguishers are available adjacent to the HWTU as shown in Figure 6.1. The portable fire extinguishers are located in the hall between the entrances to Rooms 528 and 520 and in the hall south of the south entrance to Room 520.

Additionally, for decontamination of high levels of radioactivity, an emergency shower is located in Room 601, which is in close proximity to the HWTU. For chemical contamination needs, another emergency shower is located in the hall between the entrances to Rooms 520 and 528 (Figure 6.2). An emergency eyewash is located in Rooms 520 and 528. Any contaminated water will be contained and cleaned up in accordance with the 325 HWTU contingency plan. Effluents are managed via the RPS or RLW system.

Shielded Analytical Laboratory

Four 9.0-kilogram ABC portable fire extinguishers are located in the SAL. Two portable fire extinguishers are located in Room 201, and Rooms 200 and 203 each have one portable fire extinguisher. Additionally, ABC dry chemical fire extinguishers are provided for each of the six large interconnected hot cells in Room 201. These extinguishers are mounted on the outside of each cell with the distribution system within the cells. The cell manipulator arms are used to direct the discharge at a fire within the cell.

Two emergency eye wash/showers are located in Rooms 200 and 201 (Figure 6.2). Any contaminated water will be contained and cleaned up in accordance with the 325 HWTU's contingency plan.

#### 6.3.1.4 Water for Fire Control [F-3a(4)]

The five water pipelines that service the 325 Building for fire protection supply adequate water volume and pressure. Each of these lines is 15.2 centimeters in diameter.

Three fire hydrants are located in immediate proximity to the 325 Building; one is approximately 30.4 meters east of the southeast corner of the 325 Building; one is approximately 21.3 meters directly north of the northwest corner of the 325 Building, and one is 33.5 meters west of the southwest corner of the 325 Building. In addition, the 300 Area Fire Station is located within 0.4 kilometer of the building.

### 6.3.2 Aisle Space Requirements [F-3b]

Aisle spacing is sufficient to allow the movement of personnel and fire protection equipment in and around the containers. This storage arrangement also meets the requirements of the National Fire Protection Association and the Life Safety Code (NFPA 1994) for the protection of personnel and the environment. A minimum 76.0-centimeter aisle space is maintained between rows of containers as required by WAC 173-303-630(5)(c).

## 6.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [F-4]

The following sections describe preventive procedures, structures, and equipment.

### 6.4.1 Unloading Operations [F-4a]

Procedures have been developed to prevent hazards and to minimize the potential for breakage, punctures, or the accidental opening of containers during the transfer of waste to the 325 HWTUs. All waste is inspected before acceptance to ensure that the waste is in appropriate containers and that the containers are in good condition. Inspection of containers before acceptance minimizes the potential for spills during unloading operations. The potential for spills during waste handling also is minimized through the use of appropriate container-handling equipment; small waste items can be unloaded by hand.

The volumes of dangerous waste entering and exiting the SAL are in relatively small containers (Chapter 4.0) and, have double containment because of the packaging requirements for the radioactive materials. Any spill from such containers will be contained and not released to the environment.

### 6.4.2 Run-off [F-4b]

The HWTU and SAL were designed to eliminate the likelihood of waste migration via run-off. Because the 325 HWTUs are enclosed completely (i.e., complete roof and no open walls), run-off of precipitation is not a factor. The following paragraphs address additional design features provided to eliminate the likelihood of run-off.

<u>Hazardous Waste Treatment Unit</u>

The concrete floor of the HWTU is provided with a chemical-resistant polypropylene coating. The coating covers the entire floor and extends approximately 10 centimeters up on each perimeter wall in each room. The rooms also are provided with floor drains and floor trenches at each entrance. The trenches and floor drains flow into the firewater containment tank located in the basement of the 325 Building. The management of any mixed waste that might accumulate in the tank as a result of a fire is discussed in Chapter 4.0.

<u>Shielded Analytical Laboratory</u>

The secondary containment in the SAL is divided into three systems based on three designated areas of the SAL. These areas are the six large, interconnected hot cells, the front side of the SAL, and the backside of the SAL.

The secondary containment system for the six large, interconnected hot cells involves the use of a 15.2-centimeter-wide by 6.7-centimeter-deep stainless steel trough that runs continuously along the front face of each of the 1.8-meter cells.

Typically, the use of the secondary containment system is enough to ensure that waste is safely contained. *If there were to be a larger scale spill, however, the cell base and trough would collect any spilled waste* within the cell. The spills are drained by gravity through drains in the bottom of the trough and stainless steel piping to the SAL tank.

Specially designed, shielded, 208-liter containers are used as the secondary containment system for the backside of the SAL. The backside of the SAL is used to store mainly solid mixed waste in cans, which are packed in the containers. Any liquids stored here are placed in compatible secondary containment. The secondary containment system for the front side of the SAL, which is only used minimally to store mixed waste, consists of the same practice of using the plastic, pan-type containers described previously.

The secondary containment system for the HWTU and SAL is described in detail in Chapter 4.0.

### 6.4.3 Water Supplies [F-4c]

The 325 Building is designed and operated to safely contain waste and to prevent any contamination of water supplies. The secondary containment systems, described in Chapter 4.0, prevent releases to the environment and infiltration of waste that could contaminate groundwater. The containment systems also prevent waste run-off that could contaminate surface water. The nearest water supply is the 300 Area water intake located on the Columbia River, which is less than 0.8 kilometers from the 325 HWTUs.

### 6.4.4 Equipment and Power Failure [F-4d]

The 325 Building is provided with an emergency power system that initiates upon failure of the primary power system, thereby minimizing the likelihood of the release of dangerous waste or mixed waste during a power failure or equipment failure. The 325 HWTUs have emergency lighting systems that operate automatically during power-failure incidents. For actions to be taken in the event of power failure to unit systems or equipment, refer to the contingency plan (Appendix 7A).

### 6.4.5 Personal Protection Equipment [F-4e]

Protective clothing and equipment are provided to employees during normal and emergency operations. Protection levels for emergency situations are determined either in consultation with an industrial hygienist, or applicable radiological control work permits (RWP) or applicable operating procedure.

Per the identified work requirements, protective clothing and equipment is available for all staff working at the SAL. Protective clothing and equipment available at the SAL include, but are not limited to, the following:

<u>Shielded Analytical Laboratory</u>

- safety glasses (Room 201)
- chemical protective suits (Rooms 200 and 201) (part of absorbent kits)
- goggles (Rooms 200 and 201) (part of absorbent kits)
- canner's gloves (Rooms 200 and 201) (part of absorbent kits).

Storage and treatment of dangerous waste can occur in Room 520 and 528 of the HWTU. Personal protective equipment is required for personnel working these areas of the HWTU. Protective clothing and equipment available at the HWTU include, but are not limited to, the following:

<u>Hazardous Waste Treatment Unit</u>

- laboratory (325 Building – Mens/womens change room)
- shoe covers (325 Building – Mens/womens change room)

- surgeon gloves (Rooms 520 and 528)
- chemical-resistant gloves (Rooms 520 and 528)
- chemical-resistant aprons (Rooms 520 and 528)
- face shields (Rooms 520 and 528)
- hard hats (Room 528)
- safety glasses (Rooms 520 and 528).

Personal protective equipment is required for personnel conducting sampling activities associated with the RLWT. Sampling activities for the RLWT are conducted in the tank control room. Protective clothing and equipment that will be available at the RLWT include, but are not limited to, the following:

<u>Radioactive Liquid Waste Tank System</u>

- laboratory coats (325 Building – Mens/womens change room)
- shoe covers (325 Building – Mens/womens change room)
- surgeon gloves (Control Room)
- chemical-resistant gloves (Control Room)
- chemical-resistant aprons (Control Room)
- face shields (Control Room)
- hard hats (Control Room)
- safety glasses (Control Room).

The protective equipment storage areas are well stocked at all times. This equipment is replaced periodically as it is used. The above inventory reflects each type of personal protective equipment that typically is present at the 325 HWTUs. Additional radiological and non-radiological personal protective equipment can be obtained, as needed, from storage locations and sources outside of the 325 HWTUs. These areas include the personal protective equipment storage area in the 700 hall men's and women's change rooms, Room 529, and the men's and women's change rooms in the south end (first floor) of the 325 Building. This personal protective equipment also can be obtained from onsite suppliers for the 325 HWTUs.

Respiratory protective equipment (air-purifying, full-face/negative- pressure respirators) that can be used by personnel is managed by the 325 Building Manager and must be checked out. This equipment is stored within the 325 Building. In addition, the 700 hall men's and women's change rooms normally contain a 1-week supply of coveralls, laboratory coats, hoods, skull caps, cloth shoe covers, rubber shoe covers, and gloves (canvas, surgeon's, and canner's).

## 6.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTES [F-5]

The following sections describe prevention of reaction of ignitable, reactive, and incompatible waste.

### 6.5.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste [F-5a]

The 325 HWTUs are used to store a variety of ignitable waste. Precautions to prevent ignition of ignitable waste involve separation of waste from sources of ignition and use of procedures to minimize the potential for accidental ignition. There are no routine sources of ignition or open flame in the 325 HWTUs. Work with ignition or heat sources, if required, is limited and controlled in the following ways by management and is performed in compliance with internal health and safety procedures for elimination of ignition sources.

- Use of open-flame equipment when working with flammable liquids is prohibited.
- Smoking is prohibited around flammable liquids (no smoking is allowed in the 325 Building).
- Electrical equipment used in flammable or explosive atmospheres is required to comply with the National Electrical Code, NFPA 70.
- Use of equipment with automatic, adjustable temperature controls and high-temperature limit switches is required to prevent overheating.
- Placement of flammable liquids on hot surfaces is prohibited.
- All static electricity sources are required to be grounded in areas where ignitable vapors might be present.
- Bonding of conductive containers is required when transferring flammable liquids.
- Use of nonsparking tools is required in flammable waste storage areas.

All maintenance or modifications in the 325 HWTUs that require work with ignition sources must receive prior approval by a safety engineer. This approval is documented in the operating records for the 325 HWTUs. Smoking is not allowed in the 325 Building at any time, and the interior and exterior of the building are clearly posted with "No Smoking" signs. Waste storage areas are not heated by any radiant heat source. All tools used to open ignitable waste containers are constructed of nonsparking materials.

A fire safety engineer familiar with the Uniform Fire Code inspects ignitable waste storage areas annually. This inspection is documented in the operating records for each of the 325 HWTUs. There also are storage restrictions at the 325 HWTUs for combustible waste as part of fire safety requirements. The storage restrictions defined in the Uniform Building Code for Class B Occupancy apply to the 325 Building (ICBO 1991).

### 6.5.2 Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Wastes [F-5b]

As described in Section 6.5.1, ignitable waste is managed to protect the waste from sources of ignition or open flame. Ignitable waste containers are maintained in good condition and inspected weekly to minimize the potential for releases that could result in fire. Containers of ignitable waste are protected from high temperatures to prevent the potential for pressurization and buildup of ignitable vapors. Containers of ignitable waste are stored in flammable material storage cabinets within waste storage cells (Chapter 4.0). Limitations on sizes of containers and amount of storage in cabinets are discussed in Chapter 4.0.

Small quantities of reactive waste are accepted for storage in the 325 HWTUs. Information on all reactive and other waste accepted by the HWTU and SAL is documented on a waste tracking form, which is reviewed carefully by personnel before accepting the waste. This form contains information on the unique handling requirements of the waste. Any reactive waste requiring special handling and storage to prevent unwanted reactions is appropriately packaged before arriving at the 325 HWTUs. This packaging safeguards against reactions resulting from air or water contact, shock, and other causes. Reactive waste is handled and stored in a manner commensurate with the specific reaction hazards posed by the waste.

This includes segregating the waste from other waste and reagent chemicals with which the waste potentially could react.

Because a wide variety of waste can be accepted at the 325 HWTUs, the potential exists for storage of incompatible waste. Mixing of incompatible waste is prevented through waste segregation and storage procedures. Chemical waste stored in the 325 HWTUs is separated by compatibility and hazard class and stored in separate storage areas. Separate storage shelves and cabinets are used within the storage areas (Chapter 4.0) to provide further waste segregation. Before accepting unfamiliar waste from generating units, waste management staff determines the Reactivity Group Number per A Method for Determining the Compatibility of Hazardous Wastes (EPA 1980) for each waste so that waste can be stored with compatible materials. The following general guidance is used to segregate and separate chemicals:

- Store acids on a low storage shelf or in acid storage cabinets
- Separate acids from bases and alkaline metals such as potassium or sodium
- Separate oxidizing acids from organic acids and flammable or combustible materials
- Store bases away from acids and store solutions of inorganic hydroxides in polyethylene containers
- Store oxidizers away from flammable or combustible materials and reducing agents such as zinc, alkaline metals, and formic acid
- Store peroxide-forming chemicals in air-tight containers in a dark, cool, and dry place (inside of cabinets)
- Store flammable materials in approved containers or cabinets
- Separate flammable materials from oxidizing acids and oxidizers and keep them away from sources of ignition
- Clearly mark cabinets to identify the hazards associated with their contents.

The potential for waste ignition or reaction at the 325 HWTUs also is minimized through storage restrictions on hazardous materials quantities. The storage restrictions defined in the Uniform Building Code for Class B Occupancy apply to the 325 HWTUs (ICBO 1991). The weekly inspection of the 325 HWTUs includes checking to see if waste inventories are below these limits. These inspections are documented in the operating records that (includes the weekly inspection forms) for each of the 325 HWTUs.

In the unlikely event the fire sprinkler system in Rooms 520 and 528 is activated, the resulting run-off will be contained in the firewater collection tank located in the basement of the 325 Building. This tank is described in detail in Chapter 4.0, Section 4.1.4.1.

### 6.5.3 Management of Incompatible Wastes in Tank Systems [F-5b(1)]

Waste discharged to the SAL tank from the hot cells typically consists of the same type of waste managed in the hot cells. Prior to discharge to the SAL tank, waste may be analyzed for pH, anions, metals, radionuclides, and total organic carbon to determine if the waste meets the waste acceptance criteria for the radioactive liquid waste system (RLWS). Sampling and analysis would be used if sufficient process knowledge is not available to characterize the waste for RLWS waste acceptance criteria purposes. The waste is treated in the SAL tank, if necessary.

Process knowledge will be used when possible for transfers to the RLWT from the SAL tank, HWTU, and Room 40. The waste in the RLWT will be sampled and treated for pH and chlorine as needed to protect the integrity of the tank. Sampling will be performed before each batch of waste is transferred from the RLWT to the DSTs.

### 6.5.4 Management of Incompatible Wastes in Containers or Tanks [F-5b(2)]

Incompatible waste and other materials are handled as described in Section 6.5.2 and in accordance with established operating methods. Storage restrictions that ensure proper separation of containers of incompatible material in the 325 HWTUs are described in Section 6.5.2.

Ignitable or reactive waste is not placed in the tank systems unless the waste has been treated, rendered, or mixed so that the waste no longer meets the definition of ignitable or reactive waste under WAC 173-303-090 (Chapter 3.0).

The SAL tank and the RLWST are located well within all NFPA, state, and local code buffer zone requirements for tanks. The buffer zone around the tanks meets all applicable NFPA, state, and local codes.

Drawings of the 325 HWTUs are available to ensure that ignitable and/or reactive waste is located at least 15 meters from the unit's property line.

**Figure 6-1. Locations of Emergency Equipment at the Hazardous Waste Treatment Units**

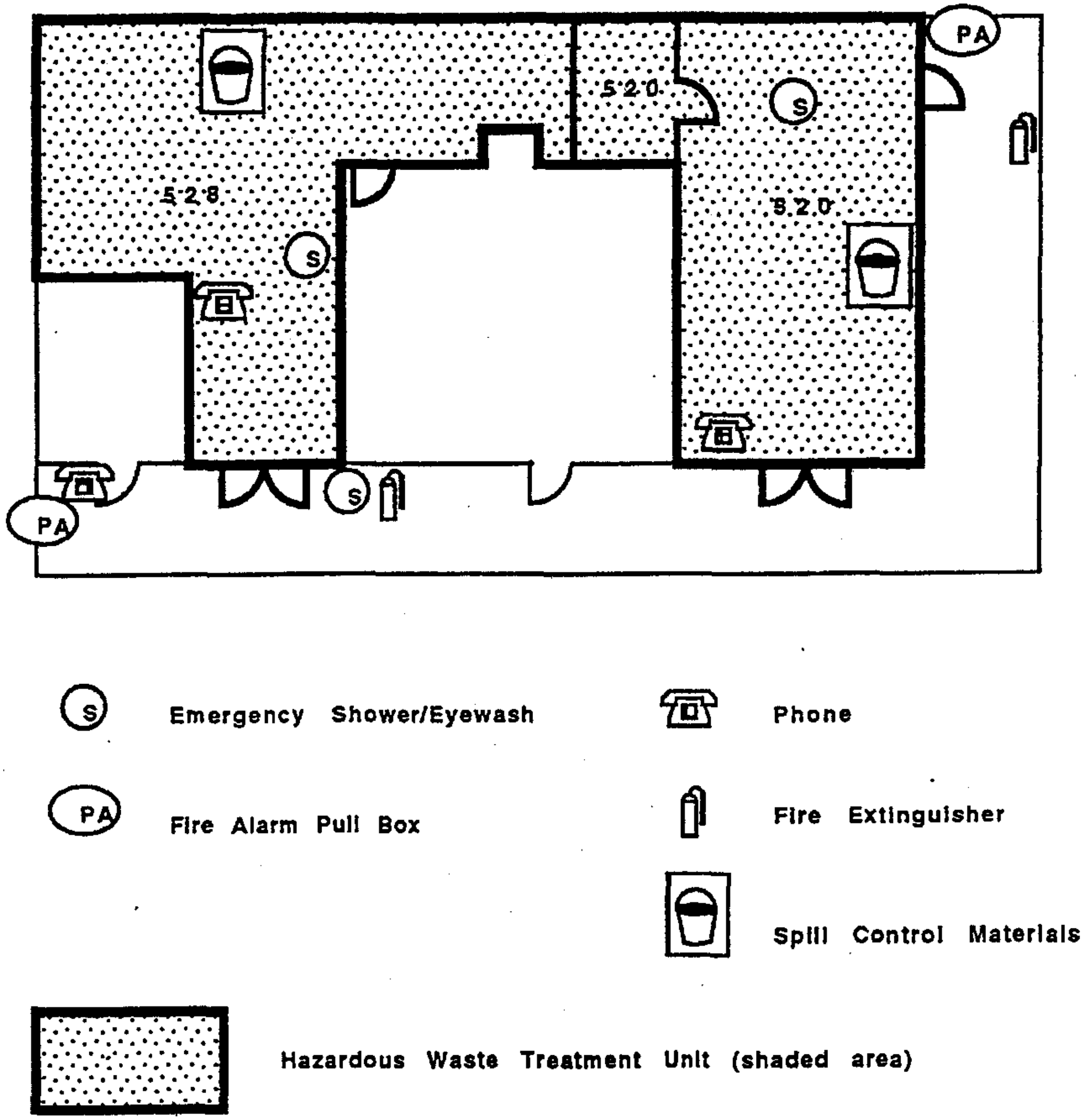
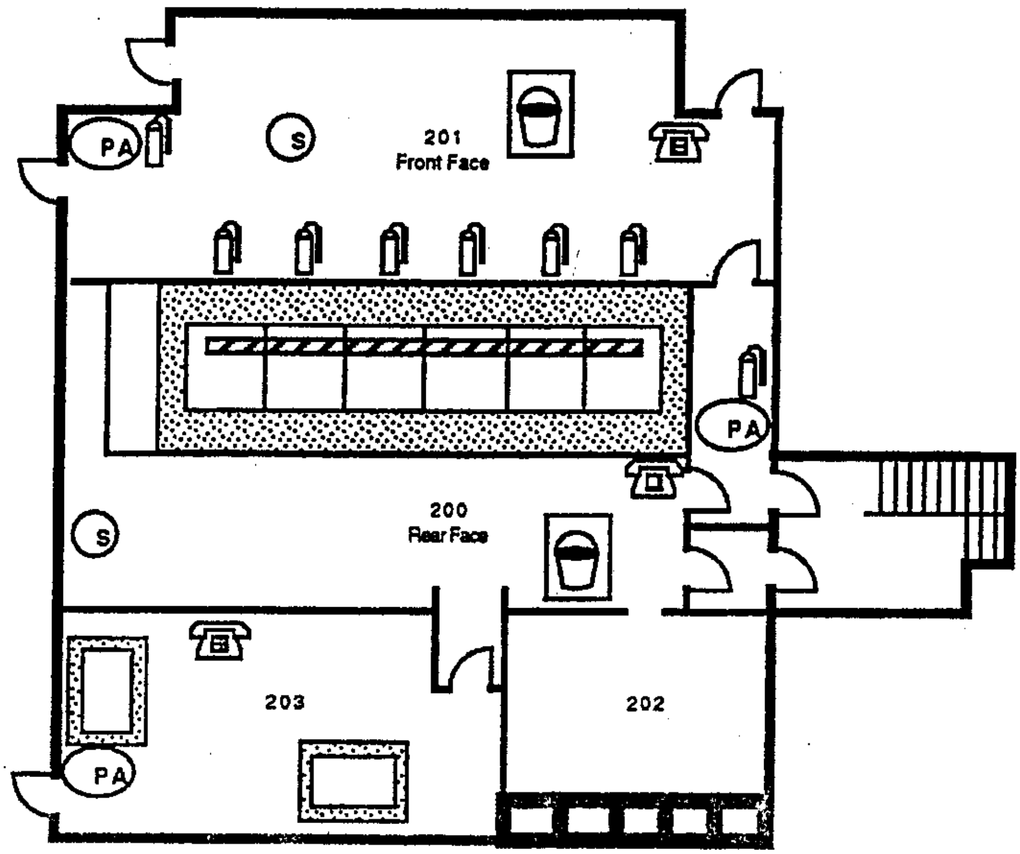


**Figure 6-2. Locations of Emergency Equipment at the Shielded Analytical Laboratory (First Floor)**




First Floor

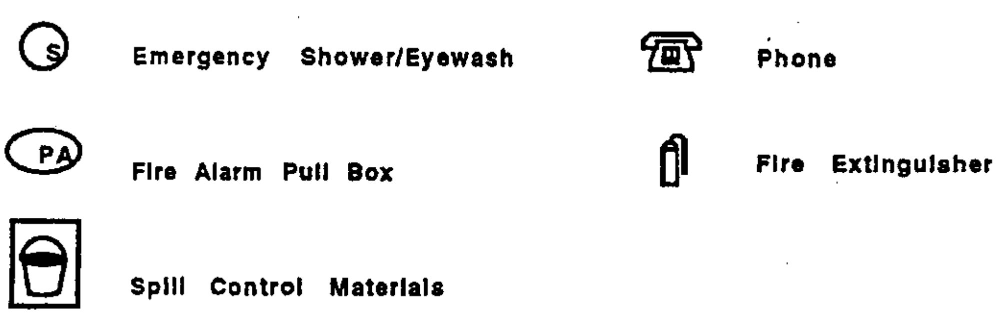


**Figure 6-3. Locations of Emergency Equipment at the Shielded Analytical Laboratory (Basement)**

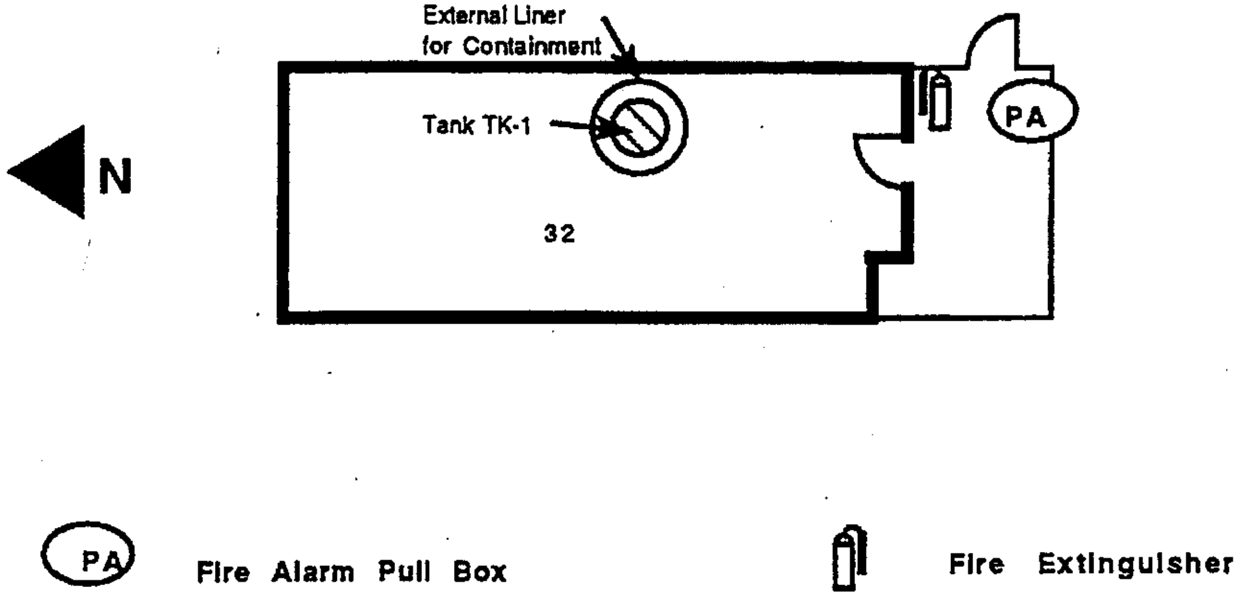


**Table 6-1. Remedial Actions for Major Problems**

| 1 Major Problems | Remedial Actions |
|---|---|
| 2 Containment system failures | |
| 3 Cracks in floor of container storage area | Remove containers from area and cease use until cracks are repaired. |
| 4 Cracks in floor of SAL cell liner | Remove containers from area and cease use until cracks are repaired or provide secondary containment for existing containers that hold liquid waste. |
| 5 Leaking container in container storage area | Transfer waste to another container. Clean up spill. |
| 6 Leaking tank or ancillary equipment | For minor leaks or drips, conduct inspection of affected equipment every 12 hours. For major leaks, immediately remove all waste from tank system. Prevent addition of waste to tank system until repaired. Notify Building Emergency Director. Initiate contingency plan if appropriate. |
| 7 Spills | |
| 8 Minor spills in container storage area | Clean up spill according to guidance in the building emergency procedure. |
| 9 Major spills in container storage areas | Notify Building Emergency Director. Initiate contingency plan if appropriate. |

# 7.0 CONTENTS



## APPENDIX

# 7.0 CONTINGENCY PLAN

The WAC 173-303 requirements for contingency plans are satisfied in the following documents: the *Building Emergency Plan for the 325 Hazardous Waste Treatment Units*, (Appendix 7A) and the *Hanford Facility Contingency Plan* (DOE/RL-91-28).

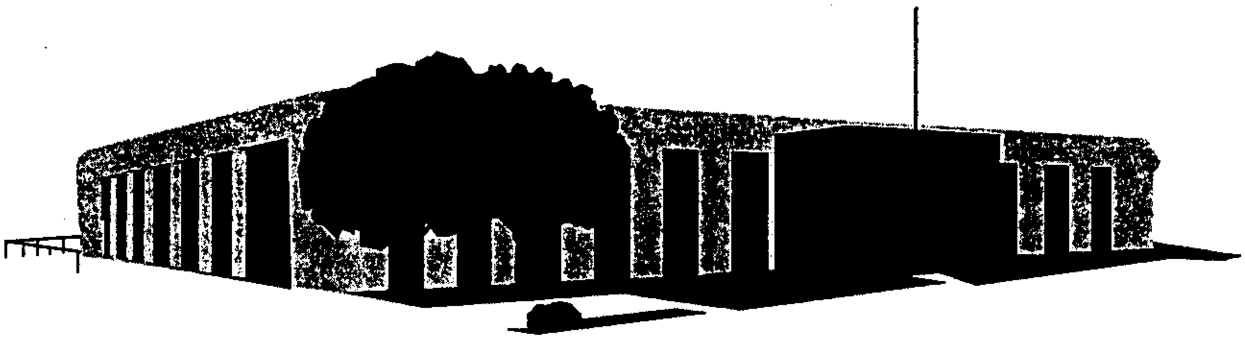
The cited contingency plan documents also serve to satisfy a broad range of other requirements (e.g., Occupational Safety and Health Administration standards and U.S. Department of Energy Orders). Therefore, revisions made to portions of the contingency plan documents that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review or approval by Ecology.

# APPENDIX 7A

## Building Emergency Plan for the 325 Hazardous Waste Treatment Units

# Building Emergency Procedure

## Radiochemical Processing Laboratory (RPL) Building



Environmental Management Services — Date: 4/6/00

Building Emergency Director — Date: 4-6-00

Facilities Operations Manager — Date: 4/9/00

March 2001
Scheduled Revision Date

Approved:

Emergency Preparedness Office — Date: 4/6/00

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# Contents

# Tables

# 1.0 General Information

The Radiochemical Processing Laboratory (RPL), (325 Building) Building Emergency Procedure has been designed to provide information necessary to minimize risks to personnel, facilities, programs and the environment in the event of an emergency. This procedure applies to all resident staff, visitors, vendors and contractor/subcontractor personnel.

This facility contains both radioactive and hazardous materials in operations, storage, and handling. The RPL Facility poses a possible significant hazard to adjacent facilities, personnel, programs and the environment.

Emergencies may arise from, but are not limited to the following:

- fire
- explosion
- loss of service systems
- a medical emergency
- bomb threats
- criticality
- criminal activity
- incidents at other facilities
- natural hazards or natural forces
- loss of contamination control
- hazardous materials release.

Expected responses are those actions, which are intended to minimize the effects of a situation while providing optimum protection to personnel. Expected responses include; notification to the PNNL Single-Point-Contact (SPC), Building Manager (BM), Building Emergency Response Organization (BERO) and personnel in the facility. This procedure also provides plans for notifying personnel to take safe actions, such as "Take Cover," "Evacuate" or other planned actions dictated by the event. The procedure provides for formal notification and reporting.

Other emergency response agencies available to assist the Building Emergency Director and Incident Commander from offsite are described in DOE/RL 94-02, Section 3.0.

## 1.1 Facility Name

Radiochemical Processing Laboratory (RPL), 325 Building.

## 1.2 Facility Location

The RPL Facility is in the Southern portion of the 300 Area, East of the 329 Building and West of the 308 Building.

## 1.3 Owner/Operator

The RPL Facility is owned by DOE-RL and operated by PNNL. The primary research organization in the RPL is the Radiochemical Processing Group (RPG) from the Environmental Technology Division (ETD). The manager of the RPG is the senior line manager responsible for all research activities within the facility. Facilities and Operations, through the Building Manager support operation and maintenance of the facility. The Building Manager is the primary Building Emergency Director (BED).

## 1.4 Facility Description

The RPL Building houses laboratories and specialized facilities ranging from work with non-radioactive materials, to work with a microgram to kilogram quantities of fissionable materials and megacurie activities of other radionuclides. Including general-purpose chemical laboratories, high-level radiochemistry facility, shielded analytical laboratory, fissionable material storage areas and 325 Hazardous Waste Treatment Units (HWTUs) (Rooms 32, 46, 200-203, 520 and 528). The general-purpose laboratories characterize fuel, single and double-shell tank waste, environmental samples, fusion/tritium samples, samples from the PUREX and $UO_3$, plants and other wastes. The radiochemistry facility includes areas for glove boxes, hot cells, cask handling, storage and the isolation of isotopes for unique applications like medical use. Analytical laboratory operations are conducted on small amounts of highly radioactive materials such as samples of single-shell tank waste. The Hazardous Waste Treatment Facility treats hazardous, mixed, low-level and transuranic waste.

## 1.5 Hanford Site Emergency Sirens/Alarms

- **Steady Siren** (3-5 minutes) – Area Evacuation – Get car keys if time permits. Go to the staging area (Lower South Parking Lot, North End of Lane #9).

- **Wavering Siren** – Take cover (seek shelter) – Take cover in nearest building, close windows and doors, wait for further instructions.

- **Howler (ah-OO-gah)** – Criticality, Nuclear excursion – Run away from alarm sound. Go directly to the staging area (Lower South Parking Lot, North End of Lane #9). Criticality alarms are tested on a quarterly basis.

- **Gong/Strobe Light** – Fire – Evacuate building via nearest exit. Assemble at the staging area (Lower South Parking Lot, North End of Lane #9).

- **Telephone Bell** – (intermittent ringing **RED telephone**) – Crash Alarm -Answer crash alarm phone. Follow instructions given on telephone. Report instructions to the **Building Emergency Director.**

## 1.6 Building Specific Emergency Alarms

The following Local Alarms are located within Radiological Control Areas of the RPL Building. Facility staff that have unescorted access to Radiological Control Areas shall be cognizant of the response to these alarms. Staff/Vendors who are under escort shall follow the directions of their escort.

### 1.6.1 Area Radiation Monitor (ARM) Alarm

- exit the Radiological Control Area that is being monitored by the ARM

- contact an RCT

- contact the PNNL Single-Point-Contact (SPC) 375-2400.

### 1.6.2 Continuous Air Monitor (CAM) Alarm

- exit the Radiological Control Area that is being monitored by the CAM

- contact an RCT

- contact the PNNL Single-Point-Contact (SPC) 375-2400.

### 1.6.3 Local Audible Differential Pressure Alarms

Local Audible Alarms are installed on the A-annex hot cells, B-annex hot cells, mini hot cell/shielded glove box in room 23, and glove boxes in rooms 201, 406, 411/415, 414, 506, 517, 525 and 528. Loss of negative pressure will activate the Local Audible Alarm to alert staff of the situation.

**NOTE: IF** a local audible alarm actuates as a result of a transient condition associated with known work conditions, **THEN** it is acceptable to wait 10 seconds for the alarm to reset before taking emergency actions. **IF** the alarm last longer than 10 seconds or the direct cause is unknown, **THEN** immediately perform the emergency actions below.

- evacuate the Immediate Area

- notify an RCT, Building Manager, and the PNNL Single-Point-Contact (SPC) 375-2400.

# 2.0 Building Emergency Procedure

## 2.1 Purpose of the Procedure

The purpose of the RPL Building Emergency Procedure is to provide staff and visitors information necessary to react to emergencies in order to:

- Maximize safety, minimize risk to life and provide prompt efficient treatment for injured staff
- Ensure continuity of leadership in emergencies and all situations
- Reduce the effects on the health and safety of PNNL staff, property, Environment, programs and the public
- Ensure prompt internal and external notifications be made to the Responsible authority
- Ensure the BEP complies with the contingency plan requirements
- Meet the requirements of DOE Order 151.1 series and 232.1A
- Meet the requirements of SBMS Subject Area: "Emergency Preparedness."

## 2.2 Procedure Reviews and Updates

The RPL Building Emergency Director is required to review and update the RPL Building Emergency Procedure annually.

The BEP will be reviewed and amended as necessary if any of the following occur:

- Applicable regulations or the HWTU's permit is revised
- The plan fails in an emergency
- The facility changes in a manner that materially increases or decreases the potential for fires, explosions, or lease of hazardous waste constituents, or in a way that changes the response necessary in an emergency
- The list of emergency coordinators changes
- The list of emergency equipment changes.

## 2.3 Making Changes to the BEP

Section 8.1.3 of PNNL-MA-110 requires the BED to keep the Emergency Preparedness Office (EPO) advised of all changes in the Building Emergency Response Organization. This may be accomplished by memo to the EPO. The Hazardous Waste Treatment Unit (HWTU) Permit Coordinator and RCRA Subject Matter Expert are also required to be notified before any changes are made to the BEP.

## 2.4 Distribution

Revision controlled copies of the BEP will be distributed to the Hanford Fire Department, Hanford Patrol, the PNNL Emergency Preparedness Office, and the HWTU Permit Coordinator. The BEP will be offered to the Richland Fire Department, Benton County Sheriff and the Kadlec Hospital.

# 3.0 Building Emergency Response Organization

The RPL Building Emergency Response Organization (BERO) is an emergency response organization with clearly defined responsibilities. The BERO consists of pre-designated and trained individuals who have been assigned emergency response activities associated with RPL. In addition, other positions in RPL have responsibilities associated with emergency responses and preparedness.

## 3.1 Line Management

The responsibilities of Line Management include the following:

- Keep the BED informed of changes in programmatic activities that could affect an emergency event
- Provide or insure training for your staff as specified in PNNL-MA-110, Section 8.4.1
- Provide training for unescorted visitors for whom you are responsible, as specified in PNNL-MA-110, Section 8.4.7
- Keep the BED and Zone Wardens informed of any staff member assigned to RPL who has a physical disability
- Being familiar with the SBMS subject area " First Aid and Medical Assistance."

Line management has the responsibility to ensure that each PNNL staff member annually reviews this procedure and documents the review with their Training Coordinator.

## 3.2 New Staff Assigned to RPL

All new assignees to the RPL Facility shall complete initial training within 10 working days of assignment. All temporary personnel with unescorted access are required to receive training before beginning work in the RPL Facility.

## 3.3 Individual Staff Members

Announce and activate the appropriate alarm and notify management upon observing an emergency. Read and understand the Building Emergency Postings and BEP. Become familiar with the BEP homepage and the Emergency Preparedness SBMS Subject Area. Avoid exposure to harmful and life-threatening conditions. Report to the staging area. Provide the BED with any information to assist in evaluating the emergency condition. Remain at the Staging Area and follow the instructions of the BED. Wear your individual Emergency Preparedness Information Card.

## 3.4 Facility Visitors

The safety of building visitors is the responsibility of the facility host, who shall ensure that visitors are provided a safe and orderly evacuation. The facility host will report the visitor status to the Staging Area Supervisor as soon, as is practical after the evacuation.

## 3.5 Supervisors/Managers

Account for all staff members. Report missing or injured members to the Staging Area Supervisor and if requested, assist the Staging Area Supervisor.

## 3.6 Unique Program Laboratory Expertise

The technical knowledge of specific programs/laboratory activities are usually known by the laboratory occupant or program manager. When applicable, Cognizant Space Managers, Alternate Cognizant Space Managers, and Team Leads may be contacted in regards to Emergencies or Off-Normal Events in assigned laboratories. Hazard Awareness Summaries containing this information are posted throughout the facility.

## 3.7 Environmental Management Services Department (Environmental Compliance Representative(s), Radiological Control, Industrial Hygienist, and Field Services Representative)

Provide event-related information as necessary for assessing facility and area conditions. The Radiological Control and Industrial Hygienist complete their related "ICP Hazards Assessor Checklist for Hazardous Facilities," Exhibit 12.6.

The Environmental Compliance and Field Services Representatives conduct activities within specific Hazardous Waste Management Activity Areas and provide support to the BED in case of an emergency. The Environmental Support Contact (376-0499) will provide any necessary notifications to regulatory agencies such as the Washington State Department of Ecology.

## 3.8 Building Emergency Directors and Alternates

### 3.8.1 Building Emergency Director

The Building Emergency Director (BED) manages facility operations and personnel and is responsible for ensuring implementation of appropriate emergency procedures and their follow up 24 hours a day. Activities include:

- Direct configuration control over facility systems and components

- Performs the duties of the Emergency Coordinator (Exhibit 12.2.3) as prescribed under WAC 173-303-360 until an Incident Command Post (ICP) is established

- Activates the BERO and allocates personnel to conduct facility-specific emergency response actions (within the affected facility boundary)

- Categorization and notification of the incident to the site contractor, SPC and/or the ONC

- Establishes the Management Support Group (MSG)

- Provides an initial EAL classification

- Directs implementation of initial preplanned area/site protective actions.

- Performs the necessary steps in the "Building Emergency Director Checklist for Hazardous Facilities," Exhibit 12.4

- Responsible for developing and transmitting event reports

- Sounds appropriate alarms

- Acts as a member of the ICP

- Arranges care for any injured persons

- Notifies the HWTU permit personnel of any planned changes to the BEP

- Ensures hazardous spill/release events are logged in the HWTU operating records

- Performs an annual review and update of the BEP

- Informs the Emergency Response Organization of any changes in RPL BERO staff.

## 3.9 Other Members of the Building Emergency Response Organization (BERO)

### 3.9.1 Incident Command Post (ICP) Communicator

The individual responsible for completing and transmitting the RL Notification Form (Exhibit 12.12) to the ONC, phoning the POC at 911 to conduct a line by line review of the RL Notification Form. Initiates and maintains a communication line between the Event Scene Liaison at the RL-EOC and the

Incident Command Post (ICP). As a precautionary measure, the BED ensures that this position is staffed for all events. Assures that the "ICP Communicator Checklist for Hazardous Facilities" is completed, Exhibit 12.5.

### 3.9.2 Assisting Communicator

Initiates and maintains a communication line with the Technical Support Representative in the RL-EOC and the ICP throughout the incident. He/she ensures that the IC and BED are aware of all transmitted and received information. Also, performs as directed by the ICP Communicator.

### 3.9.3 Incident Command Post (ICP) Recorder

Records, in a time-line format, event related notifications and activities associated with the direction administered and information received by the ICP.

### 3.9.4 Management Support Group (MSG) Lead

Determines and uses experienced staff to assist the BED in responding to an emergency related event.

### 3.9.5 Management Support Group (MSG) Recorder

Records, in a time-line format, event related notifications and activities associated with the direction administered and information received by the MSG.

### 3.9.6 Staging Area Supervisor (SAS)

Assists with personnel accountability by receiving the status of facility occupancy from the Zone Wardens then informing the BED of facility status regarding personnel. Notifies the BED if all personnel are accounted for, or if help is needed to locate or account for missing persons. Aids in area evacuation and assists with communications. During events requiring facility evacuation, ensures accountability of visitors by obtaining the PNAD sign-out sheet at the facility receptionist desk. Completes the SAS checklist, Exhibit 12.7.

### 3.9.7 Zone Wardens

Ensure that all staff have left their assigned zone and determine if aid and/or rescue is required. Aid those who need help in evacuating the building. Report the occupancy status of assigned zone to the Staging Area Supervisor and note areas that could not be checked. Assist the BED in communicating emergency messages to the building occupants. Complete the Zone Warden checklist, Exhibit 12.8.

### 3.9.8 Facility Operations Specialist (FOS)

This individual, either the BED or his/her designee, is responsible to ensure that immediate mitigative actions that cannot be delayed without threatening human health and/or the environment, are taken at the event scene. The Facility Operations Specialist (FOS) is responsible for meeting emergency responders at the event scene and providing information on event status and initial actions that are underway. This position will serve under the direction of the Hanford Fire Department/City of Richland Fire Department or Hanford Patrol Operations/Local Law Enforcement Chiefs, upon their arrival, and will provide facility expertise to support Operations Section activities. The FOS is responsible for implementing the Facility Operations Specialist check listed duties, Exhibit 12.11, and maintains a log of activities, conversations, and directives given and received.

# 4.0 Implementation of the BEP

This procedure shall be viewed from the RPL Homepage at http://w3.pnl.gov/facops2/325/info/rplfac.htm.

Consideration of implementation of the contingency plan should be made whenever unusual or emergency conditions exist that require the response of facility and/or emergency personnel and the establishment of an incident command post. Based on evaluation of the event, the BED or alternate will implement the BEP to the extent necessary to protect human health and/or the environment. The BED will complete the following checklists as they may apply to the event:

- Emergency Coordinator Duties until an Incident Command Post (ICP) is established
- Building Emergency Director Checklist for Hazardous Facilities (Exhibit 12.4)
- Delegate completion of RL Emergency Notification Form (Exhibit 12.12)
- Emergency Closeout Checklist (Exhibit 12.13).

Additional checklists identified in the BEP exhibits will be initiated and completed to the extent necessary to protect human health and/or the environment. For example:

- ICP Communicator Checklist for Hazardous Facilities (Exhibit 12.5)
- ICP Hazards Assessor Checklist for Hazardous Facilities (Exhibit 12.6)
- Staging Area Supervisor Checklist (Exhibit 12.7)
- Zone Warden Checklist (Exhibit 12.8)
- Handling of Radiologically Contaminated/Deceased Worker Checklist (Exhibit 12.9)
- Emergency Checklist for Emergency Management Support Group (Exhibit 12.10)
- Facility Operations Specialist (Exhibit 12.11).

# 5.0 Facility Hazards

The RPL contains both radioactive and hazardous chemicals that pose a potential hazard to the public, adjacent facilities, personnel, programs and the environment. Because the location of hazardous materials and equipment within the facility can change on a frequent basis due to specific research needs, a variety of informational tools have been created and integrated into daily operations. These databases are designed to help maintain the safety of all individuals and the environment. Some of the tools available within the facility are the Map Information Tool (MIT), Chemical Management System (CMS), and Hazard Awareness Summaries.

## 5.1 Hazardous Materials

This facility contains hazardous material typically found in an industrial facility including:

- chemical hazards such as corrosives, oxidizers, flammable solids and liquids, poisons, etc.
- radioactive materials
- hazardous wastes
- radioactive mixed wastes.

Refer to the RPL MIT or the Chemical Management System (CMS) to identify the hazardous materials located in a specific room (http://mit/default.htm).

## 5.2 Physical (Industrial) Hazards

The RPL facility may contain industrial hazards such as high-voltage equipment, high temperature equipment, and overhead hazards. Refer to the RPL MIT to identify the physical (industrial) hazards located in a specific room (http://mit/default.htm).

## 5.3 Dangerous Mixed Waste (if any)

See Section 5.1 above. Refer to the RPL MIT to identify the location of any dangerous mixed waste located in a specific room (http://mit/default.htm).

## 5.4 Radioactive Materials (general, if any)

See Section 5.1 above. Refer to the RPL MIT to identify if radioactive materials are located in a specific room (http://mit/default.htm).

## 5.5 Criticality (only address if possible to achieve)

The RPL is a Hazard Category II non-reactor nuclear facility designed as a multi-purpose research facility. Fissionable materials are stored in various locations in the RPL, including the first floor storage room and laboratories.

Storage of fissionable material uses a combination of mass, spacing, geometry, and moderation limits to provide criticality safety. An important criticality control element is through limiting the mass in storage containers so that even if two batches were inadvertently stored together, criticality would not occur.

The RPL Safety Analysis Report (SAR) analyzed various scenarios regarding potential criticality incidents. The nuclear criticality safety program administered within the RPL provides the administrative and physical controls necessary to ensure the possibility of a criticality event remains extremely unlikely. The criticality alarms for the facility are tested on a quarterly basis.

# 6.0 Potential Emergency Conditions and Appropriate Response

## 6.1 Facility Operations Emergencies

For an Off-Normal Event or Emergency Condition not specifically addressed, call the PNNL Single-Point-Contact (SPC) on 375-2400. PNNL staff who observe a facility condition which may include, but not limited to the following: smoke, heat, vibration, or unusual sounds such as hissing should leave the area immediately and make the appropriate emergency notifications. The following guidance is offered for specific listed incidents:

### 6.1.1 Loss of Electrical Power

1. **(Signal): NONE**

2. **Response/Action**

    - Close Fume Hoods Sashes.
    - Shut down all equipment (if time permits).
    - Secure Special Nuclear Material(s).
    - Secure Classified Documents.
    - Secure all Hazardous Materials.
    - Exit Radiological Control Areas in an orderly manner and report to the RPL main floor lunchroom/lobby.

3. **If Standby Power Fails: Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.**

    - If wearing PPE clothing, or you suspect that you may be contaminated, isolate yourself from other building occupants and await survey by Radiological Control Personnel.
    - Zone Wardens and all Staff are to remain at the Staging Area and follow the instructions of the RPL Building Emergency Director.

### 6.1.2 Major Process Disruption/Loss of Building Control

Information applicable to this emergency condition is found in Sections 6.1.1, 6.1.3, 6.1.4.a, and 7.0.

### 6.1.3 Pressure Release (if possible)

Information applicable to this emergency condition is found in Sections 6.1.4.a, 6.1.5, 6.1.9, or 6.1.12.

### 6.1.4 Fire

1. **(Signal): GONG/STROBE LIGHT**

2. **Response/Action if you are notified of a fire and time permits:**

   - Shut down equipment
   - Close doors/windows
   - Secure Nuclear Materials
   - Secure classified documents or carry them with you
   - Evacuate the building through the nearest exit that you can safely use
   - Do not remove PPE clothing prior to exiting the facility, (keep separate from the rest of the staff at the staging area until an RCT has performed the appropriate survey)
   - BED reports to the scene
   - BED obtains all necessary information pertaining to the incident.

3. **Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.**

   - Zone Wardens and all staff are to remain at the staging area unless directed/released by the RPL Building Emergency Director.
   - If wearing PPE clothing, or you suspect that you may be contaminated, separate yourself from other building occupants and await a survey by Radiological Control Personnel.

4. **If you discover a fire, the following steps are to be performed:**

   - Sound the alarm
   - Notify PNNL Single-Point-Contact (SPC) 375-2400

- Fight the fire, (if able to do so *safely*)

- Initiate the same response as listed for the situation in which you are notified of a fire.

**6.1.4.1 Explosion**

1. **(Signal): None**

2. **Response/Action**

- Pull Fire Alarm and notify nearby personnel of the emergency.

- Immediately notify the Single Point-of-Contact by 375-2400 and provide all known information, if the information can be obtained without jeopardizing personnel safety, include the following:

  - Name and callback telephone number of person reporting the incident

  - Name(s) of chemical(s) involved and amount(s) spilled, on fire, or otherwise involved in the incident

  - Location of incident (identify as closely as possible and include information about multiple building numbers)

  - Time incident began or was discovered

  - Where the materials involved are going or might go, such as into secondary containment, under doors, through air ducts, etc.

  - Source and cause, if known, of spill or discharge

  - Name(s) of anyone contaminated or injured in connection with the incident

  - Any corrective actions in progress.

3. **Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.**

- If wearing PPE clothing, or you suspect that you may be contaminated, isolate yourself from other building occupants and await survey by Radiological Control Personnel.

- Zone Wardens and all Staff are to remain at the Staging Area and follow the instructions of the RPL Building Emergency Director.

### 6.1.5 Hazardous Material Spill (radioactive, non-radioactive, toxic, or hazardous material)

1. **(Signal): NONE**

2. **Response/Action**

- Move away from substance.
- Notify nearby personnel of the emergency.
- Notify the PNNL Single-Point-Contact (SPC) 375-2400 and provide the following:
  - Name and callback telephone number of person reporting the incident
  - Name(s) of chemical(s) involved and amount(s) spilled, on fire, or otherwise involved in the incident
  - Location of incident (identify as closely as possible and include information about multiple building numbers)
  - Time incident began or was discovered
  - Where the materials involved are going or might go, such as into secondary containment, under doors, through air ducts, etc.
  - Source and cause, if known, of spill or discharge
  - Name(s) of anyone contaminated or injured in connection with the incident
  - Any corrective actions in progress
  - Anyone else who the discoverer has contacted.
  - Prevent personnel exposure (e.g., set up barricades).
- Notify the Environmental Support Contact (376-0499).
- Take steps to contain the spill ONLY IF ALL THE FOLLOWING EXIST:
  - The identity of the substance is known
  - Appropriate protective equipment and control/cleanup supplies are readily available

- The discover has received training related to spill/leak control and can safely perform the action(s) without assistance, or assistance is readily available from other trained personnel.

3. **If the spill is outside of a secondary containment type space (e.g., TSD, Hot Cell, etc.):**

   - Pull the nearest fire alarm
   - Notify nearby personnel of the spill
   - Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor
   - If wearing PPE clothing, or you suspect that you may be contaminated, isolate yourself from other building occupants and await survey by Radiological Control Personnel
   - Zone Wardens and all Staff are to remain at the Staging Area and follow the instructions of the RPL Building Emergency Director.

NOTE: Clean-up materials are located in specific laboratories.

### 6.1.6 Dangerous/Mixed Waste Spill (address only if possible)

Included in emergency response for Section 6.1.5, "Hazardous Material Spill."

### 6.1.7 Transportation and/or Packaging Incidents

1. (Signal): NONE

2. Response/Action

   - When a damaged shipment of hazardous material or dangerous waste arrives at the HWTU, the shipment is unacceptable for receipt under the criteria identified in the HWTU permit.
   - Treat any release from the package as a hazardous material spill and perform response actions per Section 6.1.5, "Hazardous Material Spill."
   - Do not move the shipment.
   - Notify the generator of the damaged shipment and obtain any chemical information necessary to assist in the response.

### 6.1.8 Unusual, Irritating, or Strong Odors

1. **(Signal): NONE**

2. **Response/Action**

3. **If potentially dangerous:**

   - Activate Building Fire Alarm
   - Notify the PNNL Single-Point-Contact (SPC) 375-2400
   - Evacuate Building to Staging Area, located at the Lower South Parking Lot, North end of Lane #9 (Exhibit 12.3.4).

4. **If the occupant has knowledge of the source and scope of the release and believes the release poses no danger to staff:**

   - Notify the Building Manager
   - Notify Your Manager

NOTE: If an unusual odor is detected and the source is unknown, the RPL Building Emergency Director will determine if the building should be evacuated.

### 6.1.9 Radiological Material Release

1. (Signal): NONE

2. **Response/Action**

   - Move away from substance.
   - Notify nearby personnel of the emergency.
   - Notify the PNNL Single-Point-Contact (SPC) 375-2400 and provide the following:
     - Name and callback telephone number of person reporting the incident
     - Name(s) of material(s) involved and amount(s) spilled, on fire, or otherwise involved in the incident

- Location of incident (identify as closely as possible and include information about multiple building numbers)

- Time incident began or was discovered

- Where the materials involved are going or might go, such as into secondary containment, under doors, through air ducts, etc.

- Source and cause, if known, of spill or discharge

- Name(s) of anyone contaminated or injured in connection with the incident

- Any corrective actions in progress

- Anyone else who the discoverer has contacted

- Prevent personnel exposure (e.g., set up barricades).

- Take steps to contain the release ONLY IF ALL THE FOLLOWING EXIST:

  - The identity of the substance is known

  - Appropriate protective equipment and control/cleanup supplies are readily available

  - The discover has received training related to spill/leak control and can safely perform the action(s) without assistance, or assistance is readily available from other trained personnel.

3. **If the release is outside of a secondary containment type space (e.g., TSD, Hot Cell, etc.):**

- Pull the nearest fire alarm

- Notify nearby people of the emergency

- Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.

- If wearing PPE clothing, or you suspect that you may be contaminated, isolate yourself from other building occupants and await survey by Radiological Control Personnel

- Zone Wardens and all Staff are to remain at the Staging Area

- Follow the instructions of the RPL Building Emergency Director.

NOTE: Clean-Up Materials are located in Specific Laboratories.

### 6.1.10 Criticality

Criticality is an event, which is limited to a few specific facilities. This information is provided to all personnel entering a PNNL Nuclear Facility (RPL Building).

1. **(Signal): HOWLER (ah-OO-gah)**

2. **Responses/Action**

   - Leave the Building Immediately.

   - Run away from Alarm Sound/Building.

3. **Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.**

   - If wearing PPE clothing, or you suspect that you may be contaminated, isolate yourself from other building occupants and await survey by Radiological Control Personnel.

   - Zone Wardens and all Staff are to remain at the Staging Area and follow the instructions of the RPL Building Emergency Director.

**NOTE:** Instrumentation and procedures shall be provided for determining the radiation dose levels at the staging area and in the evacuated area following a criticality accident. Information should be correlated at a central control point (Incident Command Post).

### 6.1.11 Reduced Ventilation Flows (due to normal power failure or exhaust fan failure)

1. (Signal): NONE

2. **Response/Action**

   - Close Fume Hood Sashes

   - Exit Radiological Control Areas in an orderly manner

   - Stage in the main floor lunchroom/lobby

   - Remain in the lunchroom/lobby area and follow the instructions of the RPL Building Emergency Director.

### 6.1.12 Area Evacuation

1. **(Signal): STEADY SIREN (3 to 5 minutes)**

2. **Response/Action**

   - Follow instructions; evacuate through the nearest safe exit (Exhibits 12.3.1, 12.3.2, 12.3.3, and 12.3.4).

   - Shut down equipment (if time permits).

   - Secure Nuclear Materials(s).

   - Secure classified documents, or carry them with you.

   - Remove PPE clothing prior to exiting the Radiological Control Areas (if possible).

3. **Assemble at the Staging Area, located at the Lower South Parking Lot, North End of Lane #9 (Exhibit 12.3.4). Zone Wardens report to the Staging Area Supervisor.**

   - Zone Wardens and all Staff remain at the Staging Area and follow the instructions of the RPL Building Emergency Director.

## 6.2 Identification of Hazardous Materials in and Around the Facility

The RPL contains both radioactive and hazardous materials that pose a potential hazard to the public, adjacent facilities, personnel, programs and the environment. Within the facility, there are a variety of informational tools integrated into daily operations that are designed to help maintain the safety of all individuals and the environment. Some of the tools available within the facility are:

- Hazard Awareness Summaries – identifies the specific spaces an individual is authorized to access, the training requirements needed to access the space, and whether the requirements have been completed (http://leo.pnl.gov/cgi-bin/eops/eopsha.pl).

- Map Information Tool (MIT) – provides the capability to look up information about a specific room within the RPL to identify all the hazards contained in that location. This tool also identifies evacuation routes, fire zones and emergency equipment locations (http://mit/default.htm).

- RPL Laboratory Handbook – contains reference use information and procedures to do work safely in the RPL (http://leo.pnl.gov/cgi-bin/eops/eops_gen_handbook.pl?RPL).

- Chemical Management System (CMS) – The Laboratory-wide Chemical Management System provides an effective way to track chemicals, ensure that safety and health information for each individual chemical in a given inventory is readily available and up-to-date, and to furnish an overall chemical management system.

## 6.3 Natural Phenomena

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

### 6.3.1 Seismic Event

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

### 6.3.2 Volcanic Eruption /Ashfall

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

### 6.3.3 High Winds/Tornadoes

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

### 6.3.4 Flood

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

### 6.3.5 Range Fire

Follow directions given by Crash Alarm Telephone or RPL Building Emergency Director.

## 6.4 Security Contingencies

### 6.4.1 Bomb Threats or Suspicious Objects (e.g., suspicious objects, threats, sabotage)

1. **(Signal): NONE**

2. **Response/Action**

   - When condition is observed or bomb threat received, notify the PNNL Single-Point-Contact (SPC) 375-2400 or Building emergency Director.

   - If necessary, clear the area of personnel.

   - Do not move any suspicious objects.

- Post warnings if applicable.

- Provide Emergency Responders with Appropriate Information.

3. **If a Telephone Bomb Threat is received record the exact message and attempt to obtain the following information:**

   - When will it go off?

   - Where is it located?

   - What does it look like?

   - What kind is it?

   - Why was it placed?

   - How do you know so much about it?

   - Who put it there?

   - Where are you calling from?

   - What is your name and address?

NOTE: After receiving the information notify the PNNL Single-Point-Contact (SPC) 375-2400, give the information obtained from the caller and then notify the BED. If you receive a Written Bomb Threat, Notify the PNNL Single-Point-Contact (SPC) 375-2400 and provide the Written Bomb Threat to PNNL Security Personnel.

### 6.4.2 Hostage Situation/Armed Intruder

1. **(Signal): NONE**

2. **Response/Action**

   - When condition is observed, notify the PNNL Single-Point-Contact (SPC) 375-2400 or Building emergency Director.

   - If necessary, clear the area of personnel.

   - Do not move any suspicious objects.

- Post warnings if applicable.
- Provide Emergency Responders with Appropriate Information.

# 7.0 Facility/Area Take Cover – Shutdown of HVAC

1. **(Signal): WAVERING SIREN, CRASH PHONE MESSAGE**

2. **Response/Action**

   - Stay inside the RPL Building.
   - Exit Radiological Control Areas in an orderly manner and report to the RPL main floor lunchroom/lobby.
   - If outside, take cover inside nearest building.
   - Remain in the lunchroom/lobby and follow the instructions of the RPL Building Emergency Director.

3. **Building Emergency Director (BED) response**

   Secure the facility HVAC system per procedure SOP 325-3, Revision 3, "Heating and Ventilation Emergency Shutdown," if there is a potential for a hazardous plume to be drawn in the building OR if directed to do so by the Patrol Operations Center (POC) via a Crash Phone message.

# 8.0 Utility Disconnects Locations

The location of Utility Disconnects may be necessary under extreme emergency conditions. The RPL Building Emergency Director will determine if utility disconnects need to be disconnected/shut. Locations of the utility disconnects or values are described as follows:

## 8.1 Electrical

The RPL Building Main Electrical Control Center Switchgear is located along the central West Wall in the basement. Extreme caution shall be used in the disconnection of this power.

## 8.2 Potable/Process Water

The Internal Valves are located in the Southwest corner of Room 22 in the basement. The External PIV (black standpipe PIV) is located outside at the Southwest corner of the RPL Building.

## 8.3 Gas Supplies

The Acetylene, Methane, and P-10 Gas Distribution Systems are located at the Northeast end of the North Gas Cylinder Dock. Turn cylinders off as directed by the RPL Building Emergency Director.

## 8.4 Steam

The High Pressure Steam Supply Valves are located above the Power Operator's workstation entry door on the second floor East Equipment Room.

## 8.5 Air

The High Pressure Compressed Air Supply Valve is located at the Northeast wall of the basement near the Air Receiver Tank.

## 8.6 Ventilation

Facility Exhaust and Supply Fan Control Center is located on the second floor East Equipment room. The Emergency Power Transfer Switches for Exhaust Fans 1 and 2 are located at the Northwest outside corner of the Final Filter Building.

## 8.7 Fire Protection Supply Water

Fire Suppression Supply Water Post Indicator Valves (Red PIVs) for Riser 1 through 5 are located outside the RPL Building in the following locations:

- Riser #1 PIV, is located at the Northwest corner of the RPL Building by the boiler annex for the 328 Building.
- Riser #2 PIV, is located at the North area inside the fenced area South of the 328 Building.
- Riser #3 PIV, is located at the Southwest corner of the RPL Building.
- Riser #4 PIV, is located Southeast of the RPL-A annex.
- Riser #5 PIV, is located Southeast of the RPL-A annex.

## 8.8 Dry Pipe OS&Y

The Dry Pipe OS&Y Valve for the Dry Pipe Fire Protection System on the North/Receiving Gas Cylinder Dock is located on the second floor in the East Equipment Room at the Northeast wall. This system is supplied suppression water from Riser #2.

# 9.0 Termination, Incident Recovery, and Restart

## 9.1 Termination

The Incident Commander in consultation with the RPL Building Emergency Director will recommend termination of the event when conditions indicate that it is safe to do so. Exhibit 12.13, "Emergency Closeout Checklist," should be completed before any recommendation is made to terminate a declared emergency.

## 9.2 Recovery

A Recovery Team, consisting of the Incident Commander, RPL Building Emergency Director, and appropriate representation of all facility interests, will develop and recommend a recovery plan. The recovery plan will be reviewed and approved, meeting the requirements of PNNL-MA-110, Section 9.0, Termination, Re-entry, and Recovery.

Note: **Alternate Staging Area** – In the Event of an Extended Building Evacuation during inclement weather, the 3760 Building may be used for housing staff at the direction of the Building Emergency Director.

### 9.2.1 Emergency Decontamination Facilities

The RPL Facility Personnel Decontamination Room is located in the RPL-A annex. Radiological Control Personnel are the only staff that may perform Personnel Decontamination.

If an evacuation of the RPL Facility occurs and re-entry is not possible to decontaminate affected personnel, Radiological Control Supervision may use the 329 Building Personnel Decontamination Facility or transfer the contaminated staff to the Hanford Site Emergency Decontamination Facility.

### 9.2.2 Emergency Radiological Exposure Guidelines

In extremely rare cases, emergency exposure to radiation may be required to rescue personnel or protect major property. Emergency exposure may be authorized in accordance with the provisions contained in 10 CFR 835. The dose limits for personnel performing these operations are listed in Table 9.1.

The lens of the eye dose limit should be three (3) times the listed values. The shallow dose limit to the skin of the whole body and the extremities is ten (10) times the listed values.

**Table 9.1.** Emergency Dose Limits

| Dose Limit (Total Effective Dose Equivalent) | Activity Performed | Conditions |
|---|---|---|
| 5 rem | All | |
| 10 rem | Protecting major property | Only on a voluntary basis where lower dose limit not practicable |
| 25 rem | Lifesaving or protection of large populations | Only on a voluntary basis where lower dose limit not practicable |
| > 25 rem | Lifesaving or protection of large populations | Only on a voluntary basis to personnel fully aware of the risk involved |

## 9.3 Restart

Restart of the facility following emergencies will be conducted in a manner consistent with the recovery plan. The recovery plan will be reviewed and approved, meeting the requirements of PNNL-MA-110, Section 9.0, Termination, Re-entry, and Recovery.

# 10.0 Emergency Equipment (Crash Alarm Phones, Fire Extinguishers, etc.)

Support equipment available to assist in responding to an emergency can be found by referring to DOE/RL 94-02, Section 10.2, and the Hanford Fire Department emergency equipment listing in Appendix C of 94-02.

## 10.1 Portable Emergency Equipment

- Portable Fire Extinguishers are located throughout the facility. The locations are identified on the RPL Building Floor Plans (Appendices 12.3.1, 12.3.2, 12.3.3).

- A Mobile Command Post Vehicle can be obtained via Hanford Fire Department (HFD) main telephone number (373-2230). The HFD Battalion Commander will approve and dispatch vehicle.

## 10.2 Communications Equipment/Warning Systems

- Fire Alarm Pull Boxes are located throughout the facility. The primary locations are at all **Exits of the RPL Facility.** All locations are shown on the RPL Building Floor Plans (Appendices 12.3.1, 12.3.2, 12.3.3).

- The Crash Alarm Phone is located in Room 109, which is in the lobby area of the RPL Building.

## 10.3 Personal Protective Equipment (PPE)

Personnel protective equipment is available in the RPL facility. The RPL Laboratory Manual chapter on Personal Protective Equipment identifies appropriate guidance for use of PPE. This information can be addressed at http://leo.pnl.gov/eops/Practices/RPL/PR_19990921123810.9251.1.pdf.

Kits containing a variety of radiation monitoring instruments, forms, and equipment are available for use in an emergency. PNNL maintains these kits, which contain protective apparel, instruments, and equipment for personnel decontamination and other immediate emergency needs. These supplies and equipment are to fulfill immediate needs only during the initial stages of an emergency.

## 10.4 Spill Control and Containment Supplies

Spill Kits are located throughout the facility and are maintained by the Cognizant Space Managers. Additional Spill Kit materials can be obtained in Room 527.

# 11.0 Evacuation of Persons with a Disability or Visitors

The RPL Building Occupants shall be aware of disabled Resident Staff that may require assistance in evacuating the building. A Specific Evacuation Plan may be required for disabled staff. Alternate housing for staff that are sensitive to excessive hot or cold conditions (temperately disabled) may be required due to Emergency Response Actions. The Zone Warden, as part of assigned responsibilities, will ensure that Disabled Persons receive whatever assistance may be required for a safe and orderly evacuation. **Note: Alternate Staging Area** – In the Event of an Extended Building evacuation during Inclement weather, the 3760 Building may be used for housing staff at the direction of the Building Emergency Director.

Staff who are planning to bring a Disabled Visitor to the RPL Building shall contact the RPL Building Emergency Director to determine if a Specific Evacuation Plan will be required.

The Safety of RPL Building Visitors is the responsibility of the host, who shall ensure that visitors are provided a safe and orderly evacuation. The host shall report the visitor status to the appropriate Zone Warden as soon as practical, after the evacuation.

# 11.0 Contents

# TABLES

# 11.0 CLOSURE AND FINANCIAL ASSURANCE [I]

This chapter discusses the planned activities and performance standards for closure of the 325 HWTUs in accordance with the requirements of WAC 173-303-610. No postclosure activities currently are applicable or required because the 325 HWTUs are proposed to be clean closed.

To clean close the 325 HWTUs, it will be demonstrated that dangerous waste has not been left onsite at levels above the closure performance standard for removal and decontamination. Regulations and laws will be reviewed periodically and the closure plan modified as necessary. If it is determined that clean closure is not possible or is environmentally impractical, the closure plan will be modified to address required postclosure activities.

## 11.1 CLOSURE PLAN [I-1]

The 325 HWTUs are planned to be clean closed.

### 11.1.1 Closure Performance Standard [I-1a]

The 325 HWTUs will be clean closed in a manner that will minimize the need for further maintenance and will eliminate postclosure release of dangerous waste or dangerous waste constituents. This standard will be met by removing dangerous waste and any dangerous waste residues from the units.

If the 325 Building ceases operations (i.e., utilities are disconnected and routine personnel access is not allowed), a decision will be made whether to implement this closure plan, or if continued operating authority will be sought.

After closure, the building areas formerly occupied by the HWTUs will be in a condition suitable for use in support of ongoing or future research and development activities. This use will be consistent with other land use activities in the 300 Area.

If there is any evidence of spills or leaks from the unit into the environment, further remediation will be deferred to the final disposition of the 325 Building. A postclosure monitoring plan will then be developed.

Clean closure decontamination standards for structures, equipment, bases, liners, etc., will be those specified for hazardous debris in 40 CFR 268.45, Table 1. The 'clean debris surface' will be the performance standard for metal and concrete surfaces. This standard is consistent with Ecology guidance (Ecology 1994b) for achieving clean closure.

Attainment of a 'clean debris surface' will be verified by a visual inspection in accordance with the standard that states, "A clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices and pits shall be limited to no more than 5 percent of each square inch of surface area." (40 CFR 268.45, Table 1).

Some unit equipment such as pumps, cartridge filters, and pipes may not be sufficiently visible for in-place contamination evaluation and waste designation. Equipment that cannot be designated in-place must be removed and then designated.

Equipment and structures will be decontaminated using the procedures in Sections 11.2.3 and 11.3.3. If decontamination is impracticable, components will be removed, designated, and disposed of. All residues resulting from decontamination will be sampled and analyzed as described in Sections 11.2.4 and 11.3.6

to determine whether they are dangerous waste. Residues containing listed waste, having dangerous waste characteristics, or exceeding dangerous waste designation limits will be managed in accordance with all applicable requirements of WAC 173-303-170 through 173-303-203. [Reference WAC 173-303-610(5)].

### 11.1.2 Closure Activities [I-1b]

This closure plan describes the steps necessary to perform final closure of the 325 HWTUs. Closure activities will involve removing dangerous waste from the units and decontaminating associated structures and equipment in the units as necessary. These activities, which are discussed in subsequent sections, could be implemented at any point during the life of the 325 HWTUs.

Partial closure could involve closing the SAL, the HWTU, or the RLWT individually or closing a portion of a unit, such as the SAL tank system, which includes the tank; associated piping, valves and pumps; and the secondary containment. Except for the timing of the closure activities, these closure activities would remain identical to those described in this closure plan.

### 11.1.3 Maximum Extent of Operation [I-1b(1)]

The 325 HWTUs consist of three units, all within the 325 Building, located in the 300 Area on the Hanford Facility. The SAL is located in Rooms 32, 200, 201, 202, and 203. The HWTU is located in Rooms 520 and 528, and the firewater containment tank located in the basement beneath Room 520. The RLW system currently collects radioactive liquid waste from the SAL and the HWTU. The RLWT collects radioactive liquid waste from the SAL, RLW system, HWTU, and the other hot cells in the 325 Building. The RLW system runs throughout the 325 Building as depicted on Figures 2.3a and 2.3b. The SAL, the HWTU RLW system, and the RLWT represent the maximum extent of operations for the 325 HWTUs as indicated in the Part A, Form 3, permit application. If additional operations are added to the unit, the closure plan will be modified to reflect closure of the new areas.

## 11.2 CLOSURE OF THE HAZARDOUS WASTE TREATMENT UNIT

The following sections address the activities required to conduct closure of the HWTU.

### 11.2.1 Removing of Dangerous Waste, Disposal, or Decontamination of Equipment, Structures, and Soils

Steps for inventory removal, decontamination, and disposal of all dangerous waste containers, residues, and contaminated equipment are described in the following sections.

### 11.2.2 Removing Dangerous Waste [I-1b(2)]

Closure or partial closure activities will be initiated by removal of the dangerous waste inventory present at the HWTU at the time of closure or partial closure. Inventory removal procedures will be identical to the waste handling, treating, packaging, and manifesting activities associated with normal permitted operations at the HWTU.

All dangerous waste will be placed in containers that meet specifications stated in Chapter 4.0, Section 4.1. To the extent possible, waste will be bulked into larger containers. If waste is bulked, containers will be emptied in compliance with WAC 173-303-160 so that the containers can be considered a solid nondangerous waste. Small-quantity laboratory chemicals that cannot be bulked will be packaged in labpack containers in compliance with the requirements of WAC 173-303-161. All containers of dangerous waste will be manifested and transferred to the custody of a dangerous waste transporter having a proper dangerous waste identification number. All containers of dangerous waste will be transferred to an appropriate onsite unit permitted to manage the waste and that will ensure proper handling and disposal.

Equipment and structural components in the HWTU requiring decontamination will be decontaminated using the methods described in Section 11.2.3. All waste residues resulting from decontamination will be sampled and analyzed as described in Section 11.2.4 to determine whether the residue is mixed, dangerous, radioactive, or nonhazardous waste and to discern how to dispose of the waste properly. All residues will be removed from the units and transferred to a Treatment, Storage, and Disposal (TSD) unit having the necessary permits for proper treatment, storage, and/or disposal. Residues containing listed waste, having dangerous characteristics, or exceeding dangerous waste designation limits will be managed in accordance with all applicable requirements of WAC 173-303-170 through 173-303-203. [Reference WAC 173-303-610(5)].

### 11.2.3 Decontaminating Structures, Equipment, and Soil [I-1b(3)]

All equipment and structures in dangerous waste storage and treatment areas will be decontaminated at the time of closure or partial closure except equipment and structures that exhibit a 'clean debris surface' before starting closure activities. These will be considered decontaminated and receive to further decontamination. Initial closure activities will entail decontamination of all piping and equipment that is known to have contacted the waste. Equipment and structures to be decontaminated include the following:

- Waste handling and treatment equipment
- Glove boxes
- Open-face hoods
- Storage cabinets
- Floors, walls, and ceilings of Rooms 520 and 528
- Firewater containment tank (beneath Room 520).

Decontamination methods for equipment and structures will be selected from appropriate technologies (40 CFR 268.45, Table 1) such as washing with water, high-pressure water jet scarifiers, abrasive blasting, aquablasting, or mechanical concrete scrubbers and scarifiers. Following the decontamination process, a visual inspection will be conducted for the purpose of monitoring the effectiveness of the decontamination work.

All equipment used for decontamination will be used exclusively within the HWTU during closure activities. When all structural and equipment decontamination is complete, and when the equipment is no longer necessary, the equipment will be decontaminated before final closure of the units. All cleaning and decontamination waste will be collected and analyzed as described in Section 11.2.4. Any disposable equipment will be placed in a container and disposed at an appropriate unit based on the status of the waste as dangerous, mixed, radioactive, or nonhazardous. Dangerous waste placed in containers will be managed in accordance with Chapter 4.0.

All waste-handling equipment in the HWTU will be decontaminated by washing with water or a solvent to a 'clean debris surface' as defined in Section 11.1.1. If additional decontamination is necessary a decontamination technique will be selected from appropriate technologies (40 CFR 268.45, Table 1) such as high-pressure water wash. If adequate cleaning is not possible, the equipment will be disposed of as dangerous waste. The decision to dispose or decontaminate equipment will be made at the time of closure. The option that is the most environmentally and economically feasible will be chosen. Adequate decontamination will be determined by a visual inspection for a 'clean debris surface' as described in Section 11.1.1. All wastewater will be collected in sumps or portable containers, pumped to chemically compatible, closed-top containers, and transported and managed as described in Section 11.2.4.

The time required for decontamination of waste-handling equipment and the amount of wastewater generated by these methods will depend on the amount of equipment that needs to be decontaminated. At this time, minimal time and effort are anticipated. The wastewater to be generated through decontamination is not anticipated to exceed approximately 378 liters. The volume of solid waste generated will depend on the extent of decontamination necessary.

The radiological conditions of the unit will be established before starting closure activities. If a 'clean debris surface' is present at the time that closure activities are started, the area will be considered clean closed. In this case, housekeeping measures may be undertaken and could include sweeping, dusting, vacuuming, and wiping with soap and water. Brushing or sweeping will be used to clean up coarse debris. Vacuuming will be performed using a commercial or industrial vacuum equipped with a high-efficiency particulate air (HEPA) filter. The vacuum cleaner bag containing captured particulates will be disposed appropriately. Dust wiping will be done with a damp cloth or wipe (soaked with water) to remove dust from surfaces that cannot be decontaminated with a vacuum. The cloth or wipe also will be disposed appropriately. HEPA filters from installed equipment and vacuum cleaners will be assessed for radiological condition, designated and managed as described in Section 11.2.4. The volume of solid waste (e.g., personal protective clothing/equipment, wipes, HEPA filters, vacuum bags) generated will depend on the extent of decontamination necessary.

Minimal time will be required for setup of the decontamination equipment. Labor requirements for the process should be moderate. Minimal time also will be required for packaging debris and dismantling and removing cleaning equipment. Small quantities of wastewater (only the contents of buckets used in the decontamination procedure) will be generated. However, if a clean debis surface is not present, more sophisticated decontamination methods will be implemented. The surfaces in the HWTU that do not have a 'clean debris surface' will be treated extensively using an appropriate decontamination technology such as water washing (40 CFR 268.45, Table 1). The contaminated surfaces will be decontaminated to remove all residues from the surfaces. The contaminated waste generated by this activity will be contained by the designed spill controls already in place for the unit (i.e., fire water containment tank and associated drain lines/sumps) or by disposable absorbent pads that might be placed around the area to be water washed. Pumps or vacuums will be used to empty the wastewater from the containment area into chemically compatible, closed-top containers. Containers of wastewater will be managed as described in Section 11.2.4.

Although this method will require more time than the dusting, vacuuming, and wiping procedures outlined previously, time requirements are still considered to be minimal for the water washing approach. Wastewater generated by this method is not anticipated to exceed 500 liters.

If necessary, further decontamination methods such as sandblasting or other appropriate technologies could be used effectively to clean contaminated structure surfaces. All residues from the decontamination effort will be collected for sampling and proper subsequent disposal as described in Section 11.2.5 4. Following completion of decontamination, additional visual inspections will be performed to determine that the 'clean debris surface' standard has been achieved. In the unlikely event that structures cannot be cleaned using the methods described, these structures might be demolished, removed, and managed as dangerous waste.

The collection sumps and secondary containment system will be decontaminated by water washing. Wastewater collected from the cleaning process in each sump and containment system will be pumped into chemically compatible, closed-top containers and analyzed as described in Section 11.2.4 to determine if the wastewater is a dangerous waste under WAC 173-303-070. If the wastewater is determined to be a dangerous waste, the wastewater will be managed and disposed at an appropriate permitted unit. If the wastewater is not a dangerous waste, the wastewater will be discharged to the 300 Area retention process sewer system. The water washing of all sumps should take minimal time and should generate less than 500 liters of wastewater. Additional decontamination techniques such as grit blasting, scabbling, or chipping might be used if necessary. The volume of solid waste generated will depend on the extent of decontamination necessary.

The radiological condition of the firewater containment tank will be established before starting closure activities. The internal surface of the firewater containment tank will be visually inspected. If a 'clean debris surface' is present at the beginning of the closure process the firewater containment tank will be considered clean closed. If the surface of the liner does not meet the 'clean debris surface' standard then the firewater containment tank for the HWTU and ancillary equipment could be flushed with water, and if flushed, the water could be tested for dangerous waste constituents. Detergents, solvents, or a dilute acid wash could be required to remove constituents from the tank. In all cases, the final decontamination rinse water will be tested. To demonstrate decontamination, the interior surface of the tank liner will be visually inspected to determine if the 'clean debris surface' standard has been achieved. If this proves to be impractical or impossible the tank liner will be removed and disposed. Runoff of decontamination solutions and wastewater will be prevented either by performing cleaning activities within existing containment structures or within portable containment pans or by surrounding the decontamination area with plastic and absorbent pads.

If water flushing is unsuccessful at removing dangerous waste and dangerous waste constituents, other decontamination processes will be employed, including appropriate technologies such as aquablasting and high-pressure water jet scarifiers. The actual equipment used will consist of an appropriate combination of equipment that will be the most effective as determined by sampling results. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

Management of decontamination residues is provided in Section 11.2.4. The time requirements for decontamination of the tank are expected to be minimal, and wastewater generated by this procedure is not expected to exceed 757 liters.

All dangerous waste storage and treatment operations at the 325 HWTUs will be conducted indoors, which will minimize potential contamination of the soil and groundwater. Unit design and administrative controls minimize the possibility of loss of waste to the soil and contamination of the groundwater. The potential for degradation of surface water quality also is very low due to the building design and administrative controls employed. Additional details on spill prevention and emergency response are provided in Chapter 7.0.

### 11.2.4 Management of Decontamination Waste from HWTU

Decontamination waste from the HWTU will be placed in containers and sampled to determine disposal requirements. Samples from each container will be analyzed for the following:

- Corrosivity using the methods described in EPA SW-846 (Methods 9040/9045)
- Ignitability using methods described in EPA SW-846 (Methods 1010/1020)
- Toxicity characteristic using the Toxicity Characteristic Leaching Procedure (TCLP) described in 40 CFR 261 Appendix II (Method 1311) [including analysis for metals; volatile organics; and semivolatile organics, which includes chlorinated pesticides, using methods identified in the waste analysis plan (Appendix 3A)]
- Total radioactivity using gross alpha, gross beta, and gamma scan (Method 9310).

Other analyses might be performed based on process knowledge to determine the presence of a listed waste. The results of sample analyses will be used to determine how to dispose of decontamination waste. (Background levels will be determined by analysis of the tap water used for makeup of the decontamination solutions.) The results of the ignitability, corrosivity, and toxicity characteristic analyses will be used to determine if the waste is characteristic dangerous waste (WAC 173-303-090). The results of the radiological analyses will be used to determine whether any of the waste generated during the HWTU closure is low-level liquid radioactive waste or mixed waste. Depending on designation, decontamination waste will be managed as follows:

- Dangerous waste--Manifested and shipped and/or transferred to a permitted TSD unit
- Mixed waste--Manifested and shipped to a TSD unit as available, or treated and disposed onsite
- Low-level radioactive waste and nonregulated waste--Handled in accordance with the Liquid Effluent Consent Order (No. DE91NM-177) and Milestone M-17 of the Tri-Party Agreement.

### 11.2.5 Inspection to Identify Extent of Decontamination/Removal and to Verify Achievement of Closure Standard [I-1b(4)]

The radiological condition of the unit will be determined before starting closure activities. Attainment of a 'clean debris surface' will be verified by a visual inspection in accordance with the standard that states, "A clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices and pits shall be limited to no more than 5% of each square inch of surface area." (40 CFR 268.45, Table 1).

Areas of degraded surface material, such as significant concrete cracking or heavily gouged steel, will be evaluated by non-destructive or destructive means to determine depth of significant surface defects, amount of contamination present in the defects, and to determine if environmental contamination has resulted from the material defect.

## 11.3 CLOSURE OF THE SHIELDED ANALYTICAL LABORATORY

The activities required for the closure of the SAL are described in the following sections.

### 11.3.1 Removing Dangerous Waste, Disposal and Decontamination of Equipment, Structures, and Soils

Steps for inventory removal, decontamination, or removal of all dangerous waste containers, residues, and contaminated equipment are described in the following sections.

### 11.3.2 Removing Dangerous Waste [I-1b(2)]

Closure or partial closure activities will be initiated by removal of the dangerous waste inventory present at the SAL at the time of closure or partial closure. Inventory removal procedures will be identical to the waste handling, treating, packaging, and manifesting activities associated with normal permitted operations at the SAL.

At the SAL, liquid waste either will be treated and packaged to meet requirements for disposal in onsite units or will be transferred through the SAL tank to the RLW system and RLWT system. Liquid dangerous waste in the SAL tank will be transferred to the RLW system and then to the RLWT system. If, for some reason, the RLWT-system closes before the SAL tank, the contents of the SAL tank will be loaded into containers and managed in accordance with Section 11.2.2. Any other suitable RCRA-permitted units that might exist when the SAL tank is closed could be used as a storage alternative. Liquid waste handling, packaging, transportation, and manifesting procedures will follow those used during normal operation of the SAL.

Equipment and structural components in the 325 HWTUs will be decontaminated using appropriate methods described in Sections 11.2.3 and 11.3.3. If decontamination is impracticable, components will be removed, designated, and disposed of. All waste residues resulting from decontamination will be sampled and analyzed as described in Section 11.3.6 to determine whether the residue is mixed, dangerous, radioactive, or nonhazardous waste and to discern how to dispose of the waste properly. All residues will be removed from the units and transferred to a TSD unit having the necessary permits for proper treatment, storage, and/or disposal. Residues containing listed waste, having dangerous characteristics, or exceeding dangerous waste designation limits will be disposed of properly.

### 11.3.3 Decontaminating Equipment, Structures, and Soils [I-1b(3)]

All equipment and structures in dangerous waste storage and treatment areas will be decontaminated at the time of closure or partial closure except equipment and structures that exhibit a 'clean debris surface' before starting closure activities. These will be considered decontaminated and receive no further decontamination. Initial closure activities will entail decontamination of all piping and equipment that is known to have contacted the waste. Equipment and structures to be decontaminated include the following:

- Floors, walls, and ceilings of the SAL front face (Room 201), hot cells, back face (Rooms 200, 202, and 203), and associated airlocks
- Floors, walls, and ceiling of the basement of Room 32 in the SAL
- SAL tank and ancillary equipment
- Secondary and tertiary containment pans
- Interior surfaces of all secondary containment trenches.

Decontamination methods for equipment and structures will be selected from appropriate technologies such as washing with water, high-pressure water jet scarifiers, abrasive blasting, aquablasting, or mechanical concrete scrubbers and scarifiers. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

All equipment used for decontamination will be used exclusively within the units during closure activities. When all structural and equipment decontamination is complete, and when the equipment is no longer necessary, the equipment will be decontaminated before final closure of the units. All cleaning and decontamination waste will be collected and packaged as described in Section 11.3.6. Any disposable equipment will be containerized and disposed of based on the status of the waste as dangerous, radioactive, or nondangerous waste.

Initial gross decontamination of the hot cells will be necessary before entry of personnel into the hot cells for the visual inspection of the cell liners. The high radiation levels in the cells will preclude personnel entry into the cells, and configuration of the cells precludes thorough visual inspection of the interior surfaces of the cells. This decontamination will be accomplished using high-pressure water sprays or other appropriate decontamination techniques operated by means of the manipulators.

If a 'clean debris surface' is present at the time that closure activities are started, decontamination procedures will consist of sweeping, dusting, vacuuming, and wiping with soap and water. Brushing or sweeping will be used to clean up coarse debris. Vacuuming will be performed using a commercial or industrial vacuum equipped with a HEPA filter. The vacuum cleaner bag containing captured particulates will be appropriately disposed. Dust wiping will be done with a damp cloth or wipe (soaked with water) to remove dust from surfaces that cannot be decontaminated with a vacuum. The cloth or wipe also will be appropriately disposed. The volume of solid waste generated will depend on the extent of decontamination necessary.

Moderate time will be required for setup of the decontamination equipment. However, labor requirements for the process will be extensive for radioactively contaminated areas and particularly for the hot cells where radiation levels will be very high, and will, at least initially, require remote operations. Moderate time also will be required for packaging debris and dismantling and removing cleaning equipment. Moderate quantities of wastewater will be generated by this procedure. However, if a 'clean debris surface' is not present, more sophisticated decontamination methods will be implemented. The dangerous waste management portions of the SAL will be treated extensively using an appropriate decontamination technique (40 CFR 268.45, Table 1). The ceiling, walls, and floor will be treated by applying the decontamination technique to remove all residues from the surfaces. The contaminated waste generated by this activity will be collected in the SAL and will be managed as described in Section 11.3.6. The volume of waste generated by this procedure is anticipated to be on the order of 2,000 liters.

If necessary, more aggressive decontamination methods, such as sandblasting or other appropriate technologies, could be used effectively to clean contaminated structure surfaces. All residues from the decontamination effort will be collected for sampling and proper subsequent disposal as described in Section 11.3.6. Following completion of decontamination, additional visual inspections will be performed to determine that the 'clean debris surface' standard has been achieved. In the unlikely event that structures cannot be cleaned using the methods described, these structures might be demolished, removed, and managed as dangerous waste.

The hot cells in the SAL also include two other areas that might require decontamination. These are the storage rooms 200, 202 and 203 in the backside of SAL and the operating area (gallery). It is expected that the level of contamination will be minimal based on the operations performed. Accordingly, the level of the decontamination effort also is expected to be minimal. For example, decontamination efforts in the operating gallery might be limited to decontamination and removal of the fume hood. If a 'clean debris surface' is present at the time that closure activities are started, decontamination procedures will consist of sweeping, dusting, vacuuming, and wiping with soap and water.

All dangerous waste storage and treatment operations at the 325 HWTUs will be conducted indoors, which will minimize potential contamination of the soil and groundwater. Unit design and administrative controls minimize the possibility of loss of waste to the soil and contamination of the groundwater. The potential for degradation of surface water quality also is very low due to the building design and administrative controls employed. Additional details on spill prevention and emergency response are provided in Chapter 7.0.

If contaminated soil is found and if practical, it may be excavated, removed, and disposed as dangerous waste. Extensive soil contamination may be deferred to the closure of the 325 Building and to the CERCLA RI/FS process for the 300-FF-2 and 300-FF-5 operable units.

### 11.3.4 Decontamination of Hot Cell Trough

The collection trough in the interconnected SAL hot cells will be decontaminated using an appropriate decontamination technique (40 CFR 268.45, Table 1). Any wastewater collected in each sump from the cleaning process will be collected in the SAL waste tank system and analyzed to determine if the wastewater is a dangerous waste. If the wastewater is a dangerous waste, it will be managed and disposed at an appropriate permitted facility. If the wastewater is not a dangerous waste, the wastewater will be discharged to an appropriate radioactive waste disposal facility. The decontamination of the hot cell collection trough should take moderate time and should generate less than 500 liters of waste. Additional decontamination techniques, such as grit blasting or chemical cleaning, could be used if necessary. The volume of solid waste generated will depend on the extent of decontamination necessary.

### 11.3.5 Decontamination of the Shielded Analytical Laboratory Tank System

The SAL tank and ancillary equipment, tank secondary containment, tank tertiary containment pan, and associated tank piping will be flushed with water; the water will then be tested for dangerous waste constituents. Detergents, solvents, or a dilute acid wash could be required to remove constituents. In all cases, the final decontamination rinse water will be tested to determine whether cleaning activities are effective. Run-off of decontamination solutions and wastewater will be prevented either by performing cleaning activities within existing containment structures or within portable containment pans or by surrounding the decontamination area with plastic and absorbent pads.

If water flushing is unsuccessful at removing dangerous waste and dangerous waste constituents, other decontamination processes will be employed, including appropriate technologies such as, aquablasting, sandblasting, and high-pressure water jet scarifiers. The actual equipment used will be selected based on what the sampling results indicate will be the most effective. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

Management of decontamination residues is provided in Section 11.3.6. The time requirements for decontamination of the SAL tank system are expected to be moderate, and wastewater generated by this procedure is not expected to exceed 1,200 liters. The volume of solid waste generated will depend on the extent of decontamination necessary.

On completion of decontamination activities, the SAL tank either will remain in place for other uses within the 325 Building, will be moved for other uses on the Hanford Facility, or will be demolished and disposed as scrap (if its usefulness is determined to be complete).

### 11.3.6 Management of Decontamination Waste from SAL

Decontamination liquid from the SAL hot cells will be sent to the RLW system. All nonliquid waste generated during decontamination operations and the equipment used (e.g., sandblast grit, personnel protective equipment and clothing, disposable equipment) will be collected in 208-liter, open-head containers and stored onsite. Samples of the waste could be collected and analyzed as described in Section 11.2.4.

### 11.3.7 Inspection to Identify Extent of Decontamination/Removal and to Verify Achievement of Closure Standard [I-1b(4)]

Methods to demonstrate success of decontamination will be the same as described in Section 11.2.5 for the HWTU.

## 11.4 CLOSURE OF THE RADIOACTIVE LIQUID WASTE TANK SYSTEM

The activities required for the closure of the RLWT system in the 325 Building are described in the following sections. The RLWT system includes the storage tank, chemical addition tanks, associated pipes, valves, pumps, filters, and secondary containment system. Activities for partially closing the existing RLW system before beginning operations of the RLW system load out tank system are also described.

### 11.4.1 Removing Dangerous Waste [I-1b(2)]

Closure or partial closure activities will be initiated by removal of the dangerous waste inventory present in the RLW system at the time of closure or partial closure. Inventory removal procedures will be identical to the waste handling, treating, packaging, and manifesting activities associated with normal permitted operations of the RLW system.

Liquid waste will be transferred from the RLW system to the transfer cask and transported to the DSTs. Liquid waste handling, packaging, transportation, and manifesting procedures will follow those used during normal operation of the RLW system.

Equipment and structural components in the 325 HWTUs will be decontaminated using the methods described in Sections 11.2.3, 11.3.3 and 11.4.3. If decontamination is impractical, components will be removed, designated, and disposed of in accordance with WAC 173-303. All waste residues resulting from decontamination will be sampled and analyzed as described in Section 11.4.4 to determine whether the residue is mixed, dangerous, radioactive, or nonhazardous waste and to discern how to dispose of the waste properly. All residues will be removed from the units and transferred to a TSD unit having the necessary permits for proper treatment, storage, and/or disposal. Residues containing listed waste, having dangerous characteristics, or exceeding dangerous waste designation limits will be disposed of properly.

### 11.4.2 Decontaminating Equipment, Structures, and Soils [I-1b(3)]

All equipment and structures in dangerous waste handling, storage, and treatment areas will be decontaminated at the time of closure or partial closure except equipment and structures that exhibit a 'clean debris surface' before starting closure activities. These will be considered decontaminated and receive no further decontamination (refer to Section 11.3.3).

There are two sections of piping that were being utilized in the former RLW system but are not utilized with the new RLWT system. Both sections of the former RLW system piping are located in the northeastern portion of the building; one runs in a north-south direction and the other runs in an east-west direction. These sections of piping are capped and left in place. Decontamination and other closure activities for these abandoned pipelines will be conducted along with final closure activities for the RLWT system.

Decontamination methods for equipment and structures will be selected from appropriate technologies such as washing with water, high-pressure water jet scarifiers, abrasive blasting, aquablasting, or mechanical concrete scrubbers and scarifiers. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

All equipment used for decontamination will be used exclusively within the units during closure activities. When all structural and equipment decontamination is complete, and when the equipment is no longer necessary, the equipment will be decontaminated before the final closure of the units. All cleaning and decontamination waste will be collected and packaged as described in Section 11.4.4. Any disposable equipment will be containerized and disposed of based on the status of the waste as dangerous, radioactive, or nondangerous waste.

The radiological conditions of the unit will be established before starting closure activities. If a 'clean debris surface' is present at the time that closure activities are started, the area will be considered clean closed. For these instances, housekeeping measures may be undertaken and could include sweeping, dusting, vacuuming, and wiping with soap and water. Brushing or sweeping will be used to clean up coarse debris. Vacuuming will be performed using a commercial or industrial vacuum equipped with a HEPA filter. The vacuum cleaner bag containing captured particles will be appropriately disposed. Dust wiping will be done with a damp cloth or wipe (soaked with water) to remove dust from surfaces that cannot be decontaminated with a vacuum. The cloth or wipe will also be appropriately disposed. The volume of solid waste generated will depend on the extent of decontamination necessary.

### 11.4.3 Decontamination of Radioactive Liquid Waste Tank System

The RLWT, chemical addition tanks, ancillary equipment, tank secondary containment pan (tank pit liner), and associated tank piping will be flushed with water; the water will then be tested for dangerous waste constituents. Detergents, solvents, or a dilute acid wash could be required to remove constituents. In all cases, the final decontamination rinse water will be tested to determine whether cleaning activities are effective. Run-off of decontamination solutions and wastewater will be prevented either by performing cleaning activities within existing containment structures or within portable containment pans or by surrounding the decontamination area with plastic and absorbent pads.

If water flushing is unsuccessful at removing dangerous waste and dangerous waste constituents, other decontamination processes will be employed, including appropriate technologies such as aquablasting, sandblasting, and high-pressure water jet scarifiers. The actual equipment used will be selected based on what the sampling results indicate will be the most effective. Following the decontamination process, a visual inspection for a 'clean debris surface' will be conducted to monitor the effectiveness of the decontamination work.

Some unit material such as pumps, cartridge filters, and pipes may not be sufficiently visible for in-place waste designation. Material that cannot be designated in-place must be removed and then designated.

Management of decontamination residues is provided in Section 11.4.4. The time requirements for decontamination of the RLWT system are expected to be moderate, and wastewater generated by this procedure is not expected to exceed 34,065 liters. The volume of solid waste generated will depend on the extent of decontamination necessary.

On completion of decontamination activities, the RLWT either will remain in place for other uses within the 325 Building, will be moved out for other uses on the Hanford Facility, or will be demolished and disposed as scrap (if its usefulness is determined to be complete).

### 11.4.4 Management of Decontamination Waste from RLWT System

Decontamination liquid from the RLWT system will be sent to the DSTs via the approved shielded cask system. All nonliquid waste generated during decontamination operations and the equipment used (e.g., sandblast grit, personal protective equipment and clothing, disposable equipment) will be collected in 208-liter, open-head containers and dispositioned according to the following criteria: material that is dangerous waste (only) will be disposed of at an offsite TSD Facility; mixed waste will be transferred to the Central Waste Complex for interim storage and future treatment or disposal; and low-level radioactive waste will be disposed onsite in the 200 Area. Samples of the waste could be collected and analyzed as described in Section 11.2.4.

### 11.4.5 Inspection to Identify Extent of Decontamination/Removal and to Verify Achievement of Closure Standard [I-1b(4)

Methods to demonstrate success of decontamination will be the same as described in Section 11.2.5 for the HWTU.

## 11.5 MAXIMUM WASTE INVENTORY [I-1c]

The 325 HWTUs are used to store and treat a variety of different research-and-operations-related dangerous waste. The maximum inventory of waste that could be present at any one time in the 325 HWTUs is constrained by the following factors.

- The maximum inventory of dangerous waste stored in containers will not exceed the limits listed in the Part A, Form 3, permit application
- The maximum inventory of dangerous waste in tank storage in the SAL will not exceed 12,574 liters in accordance with the design capacity of the SAL and the RLWT and the Part A, Form 3, permit application
- The total amount of dangerous waste at any one time will not exceed Uniform Building Code hazardous material quantity restrictions (Chapter 4.0).

## 11.6 SCHEDULE FOR CLOSURE [I-1f]

Completion of closure activities is expected to take up to two years from the date of receipt of the final volume of waste at the units. This extended time period for closure is necessary due to the high radiation levels and radiological contamination present in the facility, particularly the six interconnected hot cells. Safety systems needed to protect the environment will continue to operate during the closure process. Ecology personnel will be notified by the DOE-RL at least 45 days before the final closure activities are to begin. Closure activities are summarized in Table 11.2, and a detailed schedule of closure activities is provided in Table 11.3.

## 11.7 EXTENSION FOR CLOSURE TIME [I-1g]

An extension of the time for removal of the inventory of dangerous waste from the unit designated for closure is requested for the 325 HWTUs. The high levels of radioactive materials that are present, particularly in the six interconnected hot cells, necessitate this extension. The expected time needed to remove all waste from the units is two years.

The extended period for removal of the inventory of dangerous waste is needed to accomplish the procedures that are needed to safely work with the levels of radioactive materials that are present in the SAL. All activities required to remove the inventory of dangerous waste will be conducted in accordance with applicable permit conditions and all safety systems will continue to be operated. The removal of the inventory of dangerous waste will be conducted following procedures that are designed to be protective of the workers and the environment.

An extension of the closure time is requested for the 325 HWTUs. The high levels of radioactive materials that are present, particularly in the six interconnected hot cells, necessitate this extension. The expected time needed to close the units is two years.

Decontamination of hot cells is a slow and labor-intensive operation, complicated by the fact that most of the work must be done remotely using manipulators because of the very high radiation levels that are present in the hot cells. Even after radiation levels in the hot cells have been reduced enough to allow personnel entry, work is hampered by the extensive personal protective equipment that staff are required to wear, and the strict procedures that are enforced to ensure that both workers and the environment are protected from contamination with radioactive material.

Most equipment located in the hot cells must be packaged in shielded containers. Typically, this requires extensive remotely operated size reduction of the equipment. Removal of hot cell equipment, such as is located in the SAL, usually takes many months to a year or more to complete.

The extended closure period is needed to accomplish the procedures that are needed to safely work with the levels of radioactive materials that are present in the SAL. All closure activities will be conducted in accordance with applicable permit conditions and all safety systems will continue to be operated. The closure activities will be conducted following procedures that are designed to be protective of the workers and the environment.

## 11.8 CLOSURE COST ESTIMATE [I-1h]

An annual report outlining updated projections of anticipated closure costs for the Hanford Facility TSD units having final status will be submitted to Ecology in accordance with WAC 173-303-390 by October 31 of each year.

**Table 11-1. Analysis Parameters for Closure of the 325 Hazardous Waste Treatment Units**

| Parameter and EPA SW-846a Analytical Method | Equipment and Structures Wipe Samples | Decontamination Waste Water Samples | Soil Samples (if determined to be contaminated) |
|---|---|---|---|
| pH for corrosivity<br>(Method 9040 or 9045) | | X | |
| Ignitability<br>(Method 1010 or 1020) | | X | |
| TCLP (Extraction Method 1311)<br>▪ Metals (Method 6000 and/or 7000 series)<br>▪ Volatile organics (Method 8240)<br>▪ Semivolatile organics (Method 8270)<br>▪ Chlorinated pesticides (Method 8080) | | X | |
| Total metals: antimony, arsenic, beryllium, boron, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium (Method 6000 and/or 7000 series) | X | | X |
| Volatile organics (Method 8240) | X | | X |
| Semivolatile organics (Method 8270) | X | | X |
| Radioactivity[b]<br>▪ Gross alpha (Method 9310)<br>▪ Gross beta (Method 9310) | X | X | X |

(a) SW-846 = EPA Test Methods for Evaluating Solid Wastes (Third Edition, latest update, 1986).
(b) Characterization of radionuclides is not within the scope of WAC 173-303 or of this permit application. The information on radionuclides is provided for general knowledge where appropriate.

**Table 11-2. Summary of Closure Activities for the 325 Hazardous Waste Treatment Units**

| Closure Activity Description | Expected Duration (a) |
|---|---|
| Receive final volume of dangerous waste | N/A |
| Notify Ecology that closure activities will commence (at least 45 days before final closure activities begin) | N/A |
| Remove waste inventory and package, manifest, and transport all dangerous waste for treatment, storage, and/or disposal | 80 days |
| Initial decontamination of the hot cells | 120 days |
| Remove equipment from hot cells | 270 days |
| Visual inspection of structural surfaces, equipment, troughs, and tanks in the HWTU and SAL to identify areas of contamination and to determine levels and methods of decontamination required | 30 days |
| Decontaminate structural surfaces, equipment, troughs, and tanks at the HWTU and SAL using methods determined after visual inspection | 180 days |
| Decontaminate front face and rear face | 120 days |
| Reinspect surfaces to verify thoroughness of decontamination | 2 days |
| Evaluate best methods for treatment and disposal of waste resulting from decontamination | 25 days |
| Dispose of waste resulting from decontamination | 80 days |
| Submit certification of closure to Ecology (within 60 days of completion of final closure activities) | N/A |

(a) Some activities are performed concurrently.

**Table 11-3. Closure Schedule for the 325 Hazardous Waste Treatment Units**

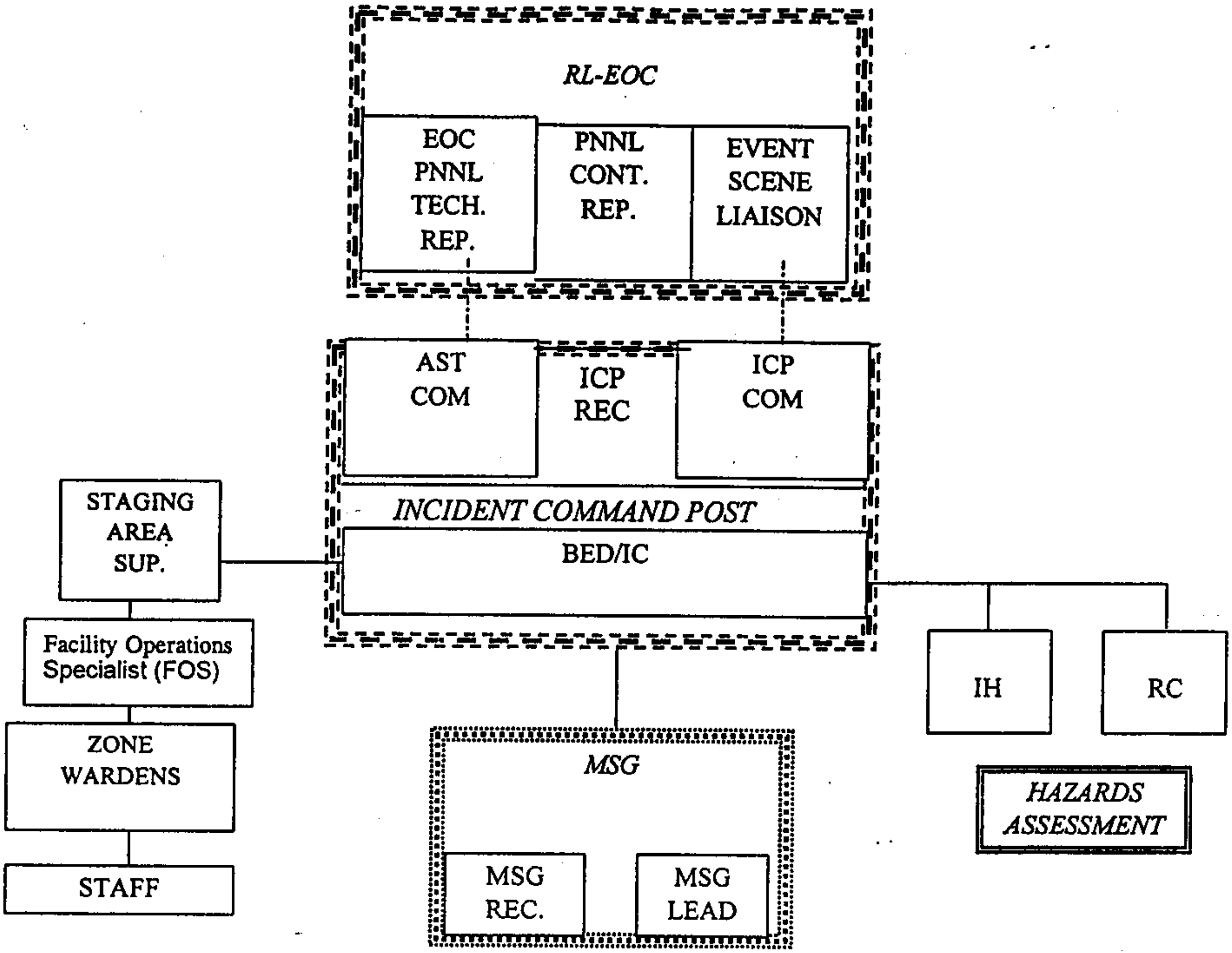
| Action | Schedule |
|---|---|
| Date of receipt of last volume of waste | Day 0 |
| Waste inventory removal | Day 90 |
| Equipment decontamination or disposal and visual inspection of structural surfaces to identify areas of contamination and to determine level of decontamination needed | Day 530 |
| HWTU and SAL structural decontamination | Day 635 |
| HWTU sump and fire water containment tank and SAL hot cells trough decontamination | Day 650 |
| Visual inspection to determine effectiveness of decontamination | Day 690 |
| Further decontamination and visual inspection, if necessary, and disposal of all decontamination waste based on results of waste analyses | Day 720 |
| Clean closure certification | Day 780 |

# 12.0 Exhibits

## Exhibit 12.1 – Building Emergency Response Organization

**BERO Members**

| BERO Position | Primary Responder | 1st Alternate | 2nd Alternate |
|---|---|---|---|
| BED | Reed Sharp | Frank A Felix | Stanley Jones |
| ICP Communicator | Stanley Jones | N/A | N/A |
| Assisting Communicator | Marie Payne | N/A | N/A |
| ICP Recorder | RPL Building Assistant | N/A | N/A |
| MSG Lead | Juan Alvarez | Glenn Buckley | N/A |
| MSG Recorder | Kelly Ledgerwood | Sherri Ray | N/A |
| Facility Operations Specialist | Jim Sportelli | Ed Arel | Lewis Hogan |
| Staging Area Supervisor | Teresa Schlotman | Karla Smith | Ed Arel |
| Zone Wardens | (See Exhibit 12.2.3) | | |




**Legend**

| | | | |
|---|---|---|---|
| AST | Assisting | IH | Industrial Hygienist |
| BED | Building Emergency Director | MSG | Management Support Group |
| COM | Communicator | RC | Radiation Control |
| CONT | Contractor | REC | Recorder |
| EOC | Emergency Operations Center | REP | Representative |
| IC | Incident Commander | SUP | Supervisor |
| ICP | Incident Command Post | FOS | Facility Operations Specialist |

Communication Link Only ___________

**BERO – EOC Interface**

# Exhibit 12.2 – Emergency References

## 12.2.1 Hanford Site Emergency Signals

| EMERGENCY SIGNALS | MEANING | REPSONSE |
|---|---|---|
| **STEADY SIREN**<br>(3-5 minutes) | Area Evacuation | Get car keys if time permits. Go to the staging area **(Lower South Parking Lot, North End of Lane #9).** |
| **WAVERING SIREN** | Take cover<br>(seek shelter) | Take cover in nearest building, close windows and doors, wait for further instructions. |
| **HOWLER**<br>**(ah-OO-gah)** | Criticality, Nuclear excursion | Run away from alarm sound. Go directly to the staging area **(Lower South Parking Lot, North End of Lane #9).** |
| **GONG/**<br>STROBE LIGHT | Fire | Evacuate building via nearest exit. Assemble at the staging area **(Lower South Parking Lot, North End of Lane #9).** |
| **TELEPHONE BELL**<br>(intermittent ringing **RED telephone)** | Crash Alarm | Answer crash alarm phone. Follow instructions given on telephone. Report instructions to the **Building Emergency Director.** |

### 12.2.2 Emergency Telephone Numbers

The Building Emergency Director (BED) has the responsibility for the welfare and safety of the building personnel and for directing efforts to control, evaluate, and terminate the event if the building is the site of the event. The BED performs the duties of the Emergency Coordinator as prescribed under WAC 173-303-360 and must have the authority to commit the resources needed to carry out the BEP. Activities include:

- Implement Emergency Response and Follow-up
- Be available 24 hours either on-site or on call
- Coordinate emergency response measures
- Cooperate with Environmental Management Services Department
- Be thoroughly familiar with:
  - RPL (325 Bldg.) Emergency Procedure
  - All operations and activities
  - Location and characteristics of waste handled
  - Location of all records
  - Physical layout of the area

**Building Emergency Director/Emergency Coordinator (BED/EC) and Alternates Emergency Telephone Numbers**

| RPL Building Emergency Director | |
|---|---|
| Reed D. Sharp | 376-5746 |
| Cellular Phone | 727-8269 |
| Pager | 546-6412 |
| Home Phone | 943-6097 |
| Home Address | 635 Birch<br>Richland, WA 99352 |
| **RPL Building, First Alternate BED** | |
| Frank A. Felix | 373-1402 |
| Cellular Phone | 539-2224 |
| Pager | 85-4356 |
| Home Phone | 737-1665 |
| Home Address | 124 S. Arthur<br>Kennewick, WA 99336 |
| **RPL Building, Second Alternate BED** | |
| Stanley L. Jones | 376-7449 |
| Pager | 546-6369 |
| Home Phone | 375-4233 |
| Home Address | 114 Sherman St.<br>Richland, WA 99352 |

| ANY EMERGENCY<br>PNNL SINGLE-POINT-CONTACT<br>375-2400 | |
|---|---|
| **Hanford Fire Department** | **375-2400<br>If Inoperable 911** |
| **Hanford Ambulance** | **375-2400<br>If Inoperable 911** |
| **Benton County Sheriff** | **375-2400<br>If Inoperable 911** |
| **PNNL Duty Officer** | **375-2400** |
| **300 Area ONC** | **376-2900** |
| **Off-Normal Event Reporting** | **375-2400** |

### 12.2.3 Zone Wardens

The Zone Wardens provide information to the Staging Area Supervisor to ensure that no one is unaccounted for, and assists as required in additional duties determined by the BED. The Zone Wardens may be assigned additional duties as needed, to assist in mitigation of an event.

**Duties and Responsibilities**

- Determine if all personnel have left their assigned work areas in the facility, including unoccupied spaces, such as stairwells, corridors, elevators, and closets.

- Perform a thorough room-by-room search (if safe to do so) to provide a high degree of assurance that the facility is free of personnel.

- Report the occupancy/accountability status to the Staging Area Supervisor, and determine if aid or rescue is required.

- Ensure that disabled persons receive whatever assistance may be required for a safe and orderly evacuation.

**Zone Warden Assignments**

| | | |
|---|---|---|
| **Zone 1** | | |
| **Rooms** | 200, 201, 201A, 202, 203, 209, 300, 301, 303, 305, 306, 308, 309, 310, 312, 313, 316, 317, 319, 319A, 320, 324, 325, 330, 327, 327A, 700, 701, 702, 703, and 705 | |
| **Primary** | Rick T. Steele | 372-0038 |
| **Secondary** | F. Vaughn Hoopes | 376-3089 |
| **Zone 2** | | |
| **Rooms** | 400, 401, 403, 404, 405, 406, 409, 410, 411, 414, 415, 416, 419, 420, 421, 425, 426, 427, 430, 500, 501, 504, 504A, 505, 506, 507, 510, 511, 514, 515, 516, 517, 520, 524, 525, 527, 527A, 528, 529, 530, 706, 710 and 711 | |
| **Primary** | Randall D. Scheele | 376-0956 |
| **Secondary** | Joel M. Tingey | 376-2580 |
| **Zone 3** | | |
| **Rooms** | 600, 601, 603, 604, 607, 608, 609, 610 and 611 | |
| **Primary** | Randy E. Thornhill | 376-6769 |
| **Secondary** | Donald E. Rinehart | 376-4337 |
| **Zone 4** | | |
| **Rooms** | 34, 35A, 36,40, 40A, 40B, 40C, 42, 43, 43A, 44, 48 50, 50A, 52, 54, 57, 57E, 57W 58,90, 93, 94, 94A, 94B, 95, 96, 97, 97A, 98, and Basement Common Space adjoining these rooms | |
| **Primary** | Paul J. MacFarlan | 376-5313 |
| **Secondary** | Raymond D. Bell | 376-7302 |

**Zone Warden Assignments (contd)**

| | | |
|---|---|---|
| **Zone 4A** | | |
| **Rooms** | 22, 22A, 22B, 23, 23A, 23B, 30A, 31, 31A, 32, 33, 55, 56, 60, 61, 62, 63, 64, 91, and Basement Common Space adjoining these rooms | |
| **Primary** | Raymond D. Bell | 376-7302 |
| **Secondary** | Paul J. MacFarlan | 376-5313 |
| **Zone 5** | | |
| **Rooms** | 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 25, 26, 27, 28, 70, 72, 74, 76 and 78 | |
| **Primary** | Sherri E. Ray | 373-9459 |
| **Secondary** | Scott M. Tingey | 372-2961 |
| **Zone 6** | | |
| **Rooms** | 905, 910, 911, 912, 914, 915, 917, 918, 919, 920, 921, 923, 924, 925, 926, 927, 928, 929, 933, 935, 937, 939, 968, and the South & West Equipment Rooms | |
| **Primary** | Larry R. Greenwood | 376-6918 |
| **Secondary** | Edmon L. Daniels | 376-3758 |
| **Zone 7** | | |
| **Rooms** | 930, 932, 936, 938, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 954, 955, 956, 957, 958, 960, 961, 964, 965, 967, and the East Equipment Room | |
| **Primary** | Kelly D. Ledgerwood | 376-4864 |
| **Secondary** | Darrin E. Faulk | 373-7713 |
| **Zone 8** | | |
| **Rooms** | 101, 102, 102A, 103, 104, 104A, 105, 106, 107, 108, 109, 109A, 204, 205, 206, and the Men's Change Room & Lunchroom | |
| **Primary** | Jim M. Sportelli | 376-2654 |
| **Secondary** | Lewis H. Hogan | 372-1427 |

**Zone Warden Assignments (contd)**

| Zone 9 | | |
|---|---|---|
| **Rooms** | 110, 110A, 110B, 110C, 111, 111A, 112, 112A, 113, 114, 115, 116, 117, 118, 119, the Women's Change Room, Main Conference Room | |
| **Primary** | Mac R. Zumhoff | 376-3171 |
| **Secondary** | Ralph C. Lettau | 376-3171 |

### 12.2.4 Staging Area Supervisor and Alternates

The Staging Area Supervisor shall direct all activities at the Staging Area and is responsible for notifying the BED if all personnel are accounted for or if help is needed to locate or account for missing personnel. In the event of an extended building evacuation during inclement weather, the 3760 facility (Old PNNL Library) may be used as an alternate staging area as directed by the BED.

Collect Building Occupancy/Accountability Status from Zone Wardens at Staging Area.

**Staging Area Supervisors**

| | Name | Phone |
|---|---|---|
| **Staging Area Supervisor** | Teresa T. Schlotman | 376-3206 |
| **First Alternate** | Karla J. Smith | 373-6481 |
| **Second Alternate** | Edward S. Arel | 376-9697 |

### 12.2.5 Emergency RPL Facility Contact Phone Numbers

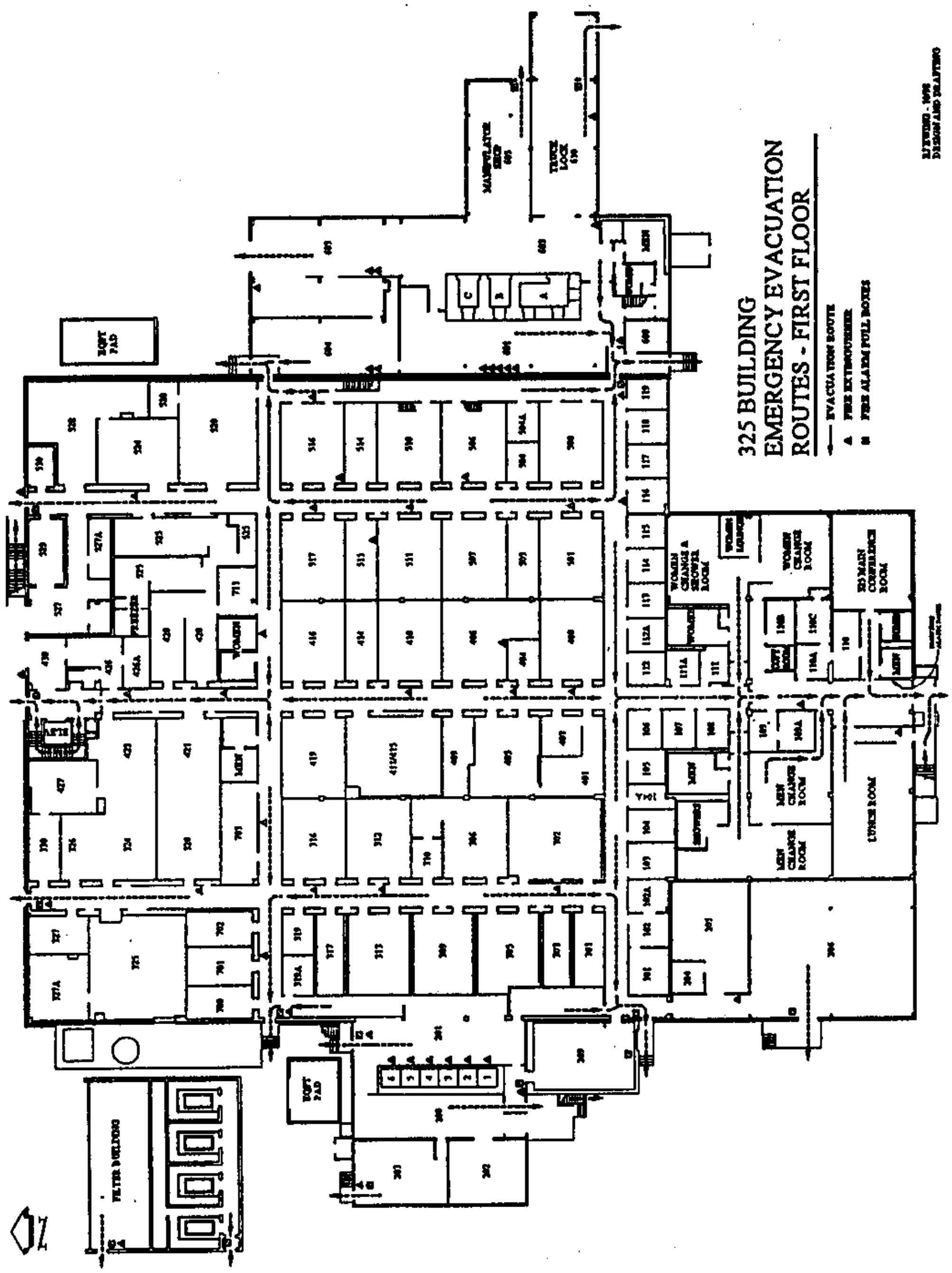
In the event of an Emergency, specific detailed facility information may be needed. Knowledge of the Building, Utilities and Radiation Hazards can be obtained from the staff listed in Table 12.1.

**Table 12.1. Building, Utilities, and Radiation Hazards Emergency Contacts**

| Title | Name | Work Phone | Cellular & Pager | Home Phone |
|---|---|---|---|---|
| Building Emergency Director (BED)<br>RPL Building Manager | Reed D. Sharp | 376-5746 | 727-8269<br>546-6412 | 943-6097 |
| First Alternate BED | Frank A. Felix | 373-1402 | 539-2224<br>85-4356 | 737-1665 |
| Second Alternate BED | Stanley L. Jones | 376-7449 | 546-6369<br>544-8499 | 375-4233 |
| RPL Building Ventilation & Power Operations Supervisor | Mike J. Moran | 376-5612 | 85-8074 | 628-9104 |
| RPL Building Radiological Control Supervisor | Scott G. Barrett | 376-2575 | 85-3753 | 946-1872 |
| RPL Facilities Project Manager | Jim M. Sportelli | 376-2654 | 727-7243<br>then<br>509-<br>727-8270 | 783-8738 |
| PNNL Single Point of Contact | | 375-2400 | | |
| **Environmental Safety & Health** | | | | |
| Occupational Safety/Fire Protection | Michael W. Fullmer | 376-1886 | 727-8246<br>85-6670 | 967-5583 |
| Industrial Hygiene | Abby L. Nicholson | 376-0345 | 727-8216<br>85-7184 | 967-6620 |
| Waste Management | | | | |
| 90-Day Storage | Raymond D. Bell | 376-7302 | 85-5518 | 943-2924 |
| TSDs | Wayne B. Larson | 376-2483 | 85-6320 | 586-1203 |
| Low-Level Waste | Rene L. Catlow | 376-4804 | | |

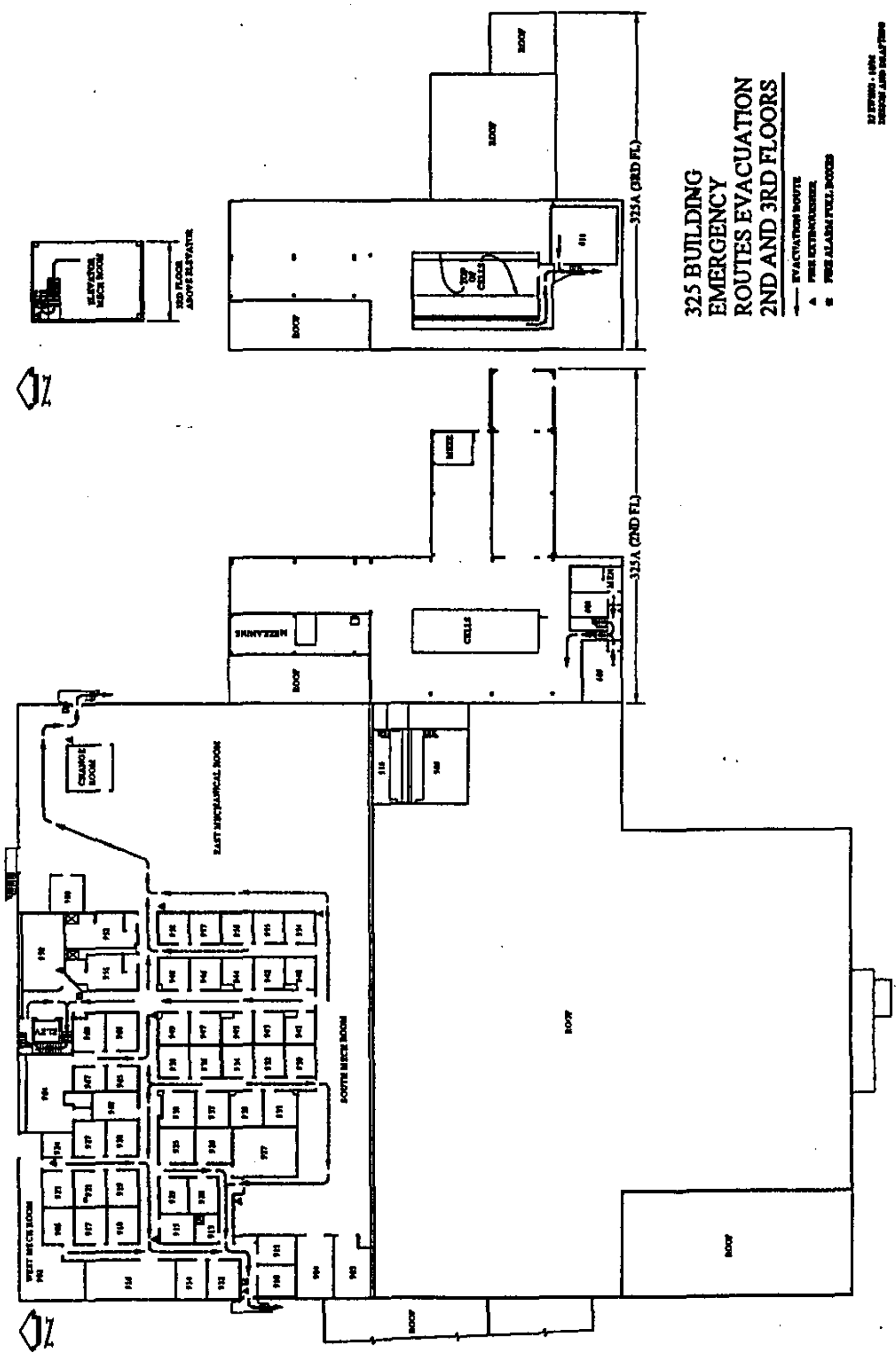
# Exhibit 12.3 – Evacuation Routes

## 12.3.1 Evacuation Routes – 1st Floor

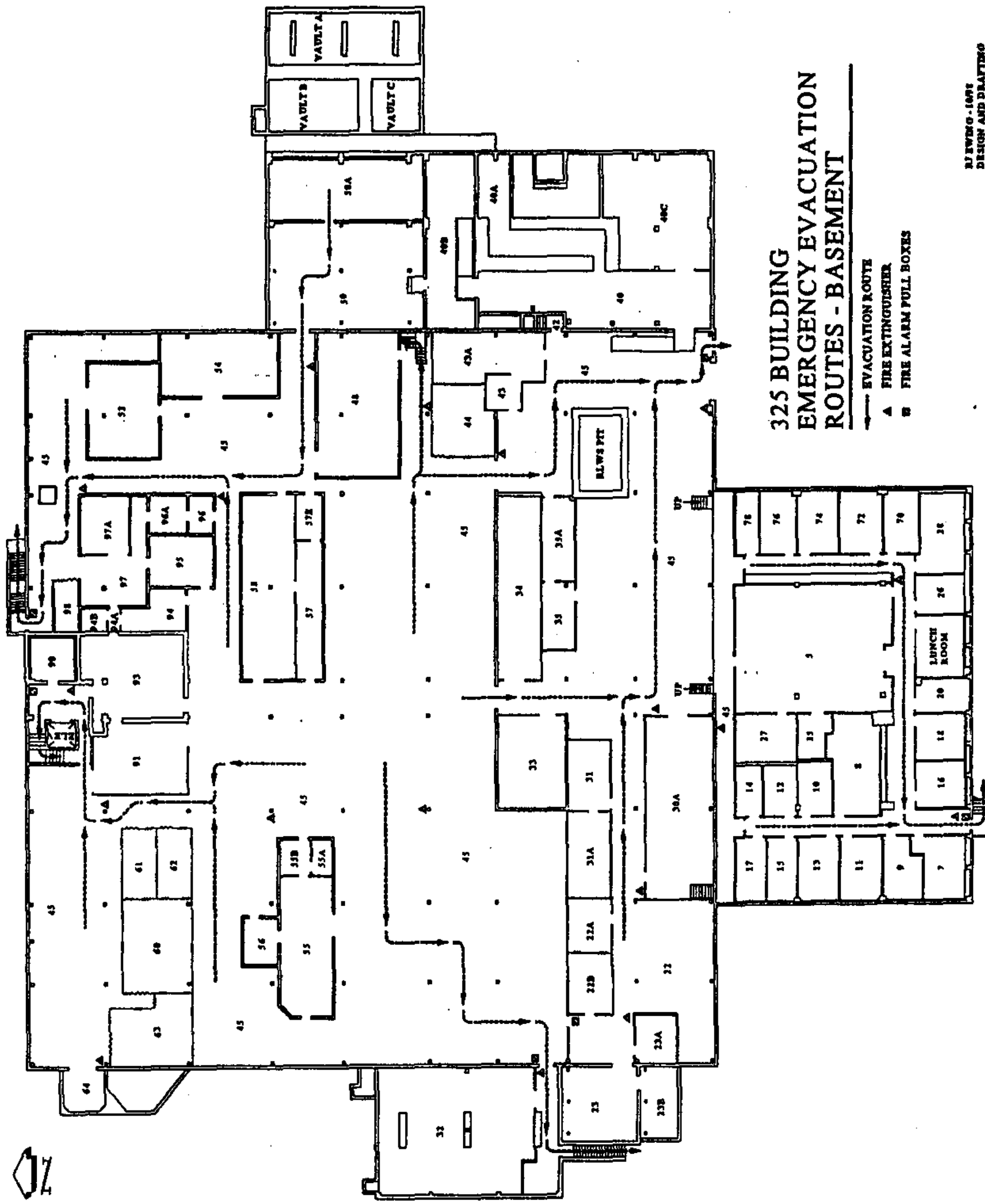



1 2

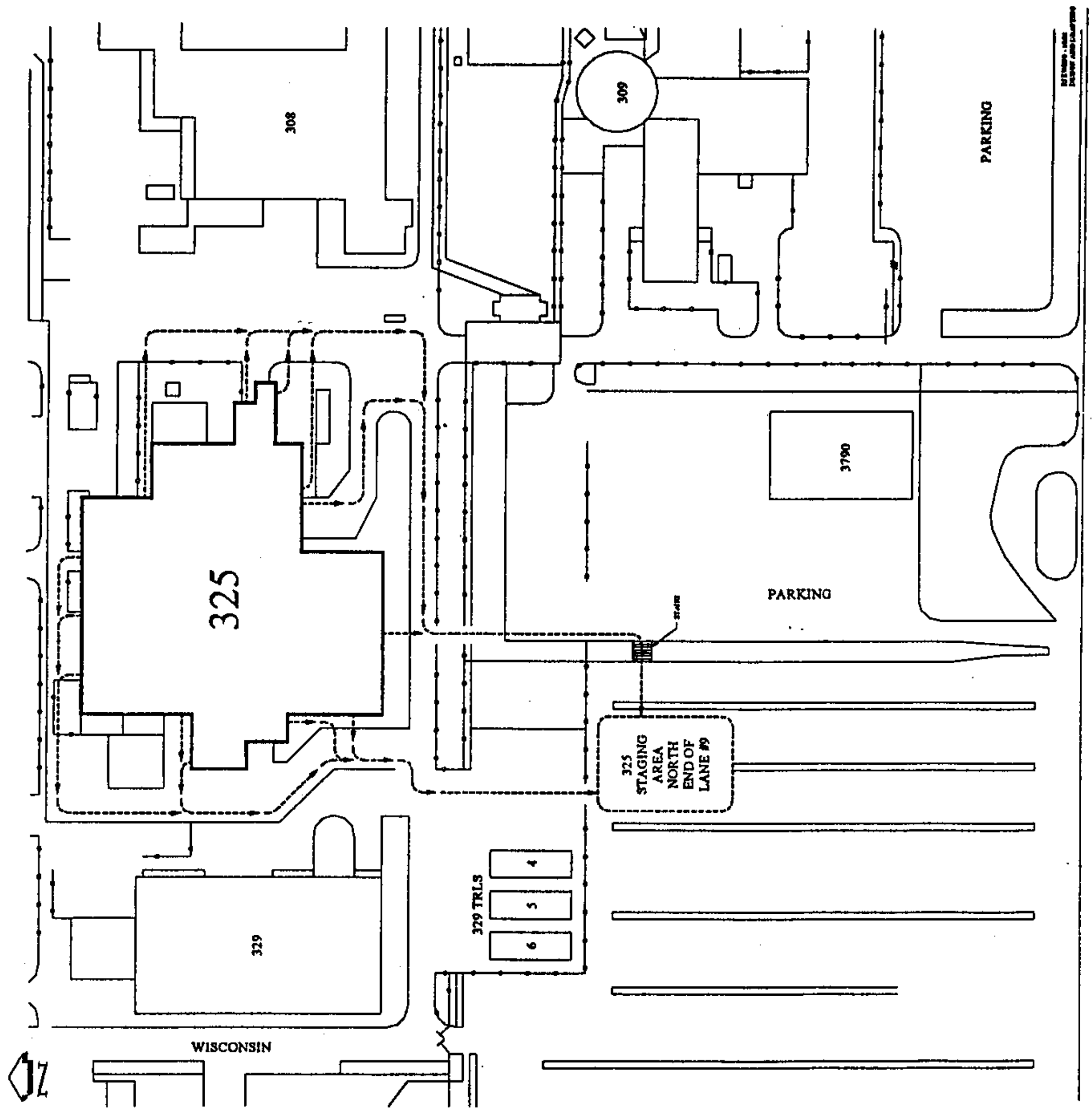
## 12.3.2 Evacuation Routes – 2nd and 3rd Floors



## 12.3.3 Evacuation Routes – Mezzanine and Basement



## 12.3.4 RPL Staging Area



# Exhibit 12.4 – Building Emergency Director Checklist for Hazardous Facilities

The BED manages facility operations and personnel, and is responsible for ensuring implementation of appropriate emergency procedures. Activities include direct configuration control over facility systems and components, allocations of plant personnel to conduct facility specific emergency response actions (within the affected facility boundary), categorization and reporting of the incident, and directing implementation of initial preplanned area/site protective actions. The BED is responsible for completing the following check listed duties for non-declared, RCRA, and DOE declared emergencies as appropriate.

During DOE declared emergencies, the shaded duties are required to be implemented.

Maintain a log of all activities, conversations and both directives given and received.

**IMMEDIATE ACTIONS**

1. ___ Upon initial discovery/notification complete the following:

   - Stop non-emergency activities in the event scene hazard area
   - Warn personnel in event scene hazard area
   - Call 375-2400.

   Determine and initiate mitigation actions that cannot be delayed without threatening human health and/or the environment.

   If available, direct a facility knowledgeable person(s) to meet and collocate with arriving emergency responders and perform the Facility Operations Specialist (FOS) checklist.

   - If a Facility Operations Specialist is not available, personnel act as the facility point-of-contact at the incident scene hazard area and perform the FOS checklist.

2. ___ Implement protective actions for facility personnel (i.e., take cover/evacuate).

   Assign door monitors as appropriate at access points during a take cover, to inform personnel of potential hazardous conditions.

| |
|---|
| The BED (until IC arrives) may permit coordinated personnel movement during protective actions. |

## Exhibit 12.4 – Building Emergency Director Checklist for Hazardous Facilities (contd)

3. ___ IF there is a chemical/radiological release that immediately threatens nearby facilities:

   - Initiate a take cover for the affected area, by calling 375-2400 or by calling the Patrol Operations Center (POC) at 911 (if using a cell phone to contact the POC dial 373-3800).

| |
|---|
| Personnel arriving at Hanford Patrol access control points will be required to obtain BED (until IC arrives) approval and safe routes of travel before being allowed to proceed to the ICP. |

   - Direct the Hanford Patrol to isolate the affected area.

4. ___ Provide location and recommended safe route to facility operations personnel meeting emergency responders.

5. ___ Establish an initial ICP and report location to the SPC 375-2400.

   - Assign Communicator and begin assigning other initial ICS functions as required to meet the needs of the incident

6. ___ Refer to facility specific EAL appendices for recognizing and classifying emergencies and/or event classification descriptions for event classification.

   IF the EAL criteria is met:

   - Direct the ICP Communicator to implement check-listed duties.

     NOTE: If the ICP Communicator is not available, delegate completion of the RL Notification form to the ONC.

   - Ensure the POC has implemented onsite protective actions.
   - Review items 1-9 on the RL Notification form once completed. Correct any discrepancies as necessary.
   - Sign in approval block and note time of declaration of event classification.
   - Return RL Notification form to ICP communicator for transmittal to ONC.
   - Proceed to Step #7.

**Exhibit 12.4 – Building Emergency Director Checklist for Hazardous Facilities (contd)**

IF the EAL criteria is not met:

- Ensure the ONG (376-2900) is notified for evaluation of event against not classified event notification criteria.

- Proceed to step #7.

7. ___ IF incident involves a spill, release, fire, or explosion, or exceeds environmental permits,

   THEN notify Environmental Services Integration and follow your contractor specific spill/release notification process or procedure. (Contact the SPC for a Prime Contractor specific single-point-of-contact if necessary).

## FOLLOW-UP ACTIONS

8. ___ Ensure occurrence reporting requirements per the appropriate contractor procedure in accordance with RLID 232.1A, "Notification, Reporting, & Processing of Operations Information" are initiated.

9. ___ Confirm that facility personnel accountability has been conducted and evacuated personnel (if any) have been moved to a safe location.

10. ___ Provide initial briefing to IC and ICP personnel including:

    - Potentially affected personnel
    - Incident and facility conditions
    - Notifications (environmental/emergency and person or agency contacted)
    - Protective actions implemented
    - Status of event classification
    - Mitigation efforts underway
    - Accountability status of facility personnel
    - Status of injured, contaminated or exposed personnel

**Exhibit 12.4 – Building Emergency Director Checklist for Hazardous Facilities (contd)**

- Status of assigned ICS functions
- Status of shutdown equipment.

| |
|---|
| At the completion of turnover from the BED to the IC, the IC shall assume responsibility for command and control of the incident. |

11. ___ Coordinate the establishment of operations protocols with the IC based on the availability of personnel.

    - Discuss location of Resource Staging Area.
    - Assist IC in assigning other functional components of the ICP, as necessary.

12. ___ Contact the SPC and direct the following:

    - Inform the RL ICP Representative of facility incident status and location of the ICP.
    - If the facility RL ICP Representative is not available, direct the SPC to contact the divisional on-call DOE representative listed in the Site Weekly On-Call Directory.
    - If the Site Weekly On-Call List is not available, contact the ONC (dial 376-3030).

13. ___ IF the IC directs you to conduct a turnover briefing with the SED,

    THEN dial 376-6185 and provide a briefing as previously outlined above.

14. ___ Upon RL-EOC becoming operational, transfer the responsibility for event classification and ensuring the implementation of onsite protective actions to the SED after providing turn over briefing.

15. ___ Ensure the IC is kept informed on the status of facility personnel and activities.

16. ___ IF any personnel are deceased, injured, contaminated, potentially exposed, or transported by ambulance and the RL-EOC is not activated,

    THEN notify the EDO, via the ONC (at 376-2900) to have the Health Advocate notified.

**Exhibit 12.4 – Building Emergency Director Checklist for Hazardous Facilities (contd)**

- Cellular telephone or radio users shall not use the name(s) or payroll number(s) of involved personnel.

17. ___ IF any personnel are deceased, injured, contaminated, potentially exposed, or transported by ambulance and the RL EOC is activated:

    THEN notify the POC and the ICP Communicator. In both cases, provide the name(s), payroll number(s) and circumstances of the incident.

    - Cellular telephone or radio users shall not use the name(s) or payroll number(s) of involved personnel.

18. ___ Participate in ICP briefings as required (IC may have BED lead ICP briefings).

19. ___ Discuss event reclassification with the IC and Liaison Officer (EDO), and provide recommendation to the SED (dial 376-6185) if warranted by incident conditions.

20. ___ When the incident is stabilized, participate in a debriefing with the IC and take actions to return facility to normal operations.

    **NOTE:** Refer to Exhibit 12.13 "Emergency Closeout Duties" for check list items to consider before any recommendation is made to terminate a declared emergency.

21. ___ When incident is stabilized, refer to RLEP 3.4, Event Termination, Reentry and Recovery, to coordinate termination of the emergency.

22. ___ Ensure all hazardous material generated is handled appropriately and that incompatible waste is handled or stored in the area until necessary cleanup has occurred.

23. ___ Ensure the Environmental Support Contact is notified (376-0499) if the event involved a hazardous material spill/release and that the event is logged in the HWTU operating record.

## Exhibit 12.5 – ICP Communicator Checklist for Hazardous Facilities

The ICP Communicator is the individual responsible for:

- Completing and transmitting the RL Notification Form to the ONC
- Phoning the POC at 911 to conduct a line by line review of the RL Notification Form (the ONC Duty Officer immediately transmits the form to the POC)
- Maintaining a communication line with the Event Scene Liaison in the RL-EOC throughout the incident.

The ICP Communicator must ensure that the IC and BED are aware of all transmitted and received information. As a precautionary measure, the BED ensures that this position is staffed for all events, however for the purposes of this checklist, the ICP Communicator is responsible for implementing the following check listed duties for non-declared, RCRA, and DOE declared emergencies, as appropriate. During DOE declared emergencies the shaded duties are required to be implemented. Maintain a log of ICP communications.

1. ___ Upon notification, and after receiving safe routes of travel, respond to the ICP as soon as practical and receive incident status from the BED.

   - Assist the BED with event communications.

2. ___ Get a current copy of RL Notification Form (RL-F-5540.1).

3. ___ Get current area meteorological data.

   - Contact the Pacific Northwest National Laboratory Weather Station (373-2710 or 373-2716 – 24 hours Mon-Fri, 0600-1400 hrs on weekends/holidays).
   - Record the wind speed (in miles/hour), direction (from/to), and stability class on the RL Notification Form.
   - If meteorological data is not available, enter the words "Not Available" in Section 8 of the RL Notification Form.
   - Provide meteorological data to ICP Hazards Assessors.

**Exhibit 12.5 – ICP Communicator Checklist for Hazardous Facilities (contd)**

4. ___ Complete items 1 – 9 of RL Notification Form, as known.

   - Obtain BED review, signature, and time of declaration of classification.

   **NOTE**: For DOE Alert level or higher declared events, Event Classifier reporting duties are no longer required.

   - FAX completed RL Notification form to the ONC on 376-3781.
   - Dial 911 and make notification of declared emergency (Cell Phone dial 373-3800)
   - Wait for the POC to initiate the POC/ONC conference bridge, and provide the ONC Duty Officer the information listed in items 1 – 9 from the RL Notification Form.

5. ___ Ensure POC initiates onsite protective actions per the quick reaction checklists, and that the ONC initiates offsite notifications.

6. ___ IF during the incident, the emergency class is upgraded AND the RL EOC is NOT operational,

   THEN repeat check listed duties 2 – 5 above.

7. ___ Establish the ERO Communication Line.

   - Dial 372-8145.
   - Identify yourself as the ICP Communicator.
   - When the RL-EOC Event Scene Liaison comes on the line you will hear a series of beeps.
   - Serve as the ICP Communicator providing continuous incident status over the ERO Communication Line.

8. ___ When the RL EOC is activated, inform the BED and IC.

**Exhibit 12.5 – ICP Communicator Checklist for Hazardous Facilities (contd)**

9. ___ Provide the RL-EOC Event Scene Liaison a status on the following:

- Protective actions implemented by facility.
- Protective action requested of other organizations (i.e., HPD, HFD).
- Incident conditions.
- Mitigative actions.
- Injured, deceased, contaminated, or potentially exposed personnel, and personnel transported by ambulance.

10. ___ Direct information requests from the RL-EOC to the IC and BED.

NOTE: If the EOC is manned, the Assistant Communicator should establish a communications link with the PNNL Technical Support Representative – (376-7148)

11. ___ Relay ICP requests for resources over the ERO Communication Line.

- Most resource requests should be provided to you to pass over the communication line, however, other ICP functions (i.e., Logistics, Planning) may make resource requests over this line if necessary.

12. ___ Participate in ICP briefings as required.

## Exhibit 12.6 – ICP Hazards Assessor Checklist for Hazardous Facilities

This checklist has two parts: 1) Radiological Hazards Assessor and 2) Chemical Hazards Assessor.

### 12.6.1 Part 1, Radiological

The Radiological Hazards Assessors are responsible for coordinating and ensuring accomplishment of radiological control functions throughout the scene. This position reports to the Operations Section Chief at any assigned location. The affected facility's radiological control manager or equivalent will fill this position. The Hazards Assessor is responsible for implementing the following check listed duties for non-declared RCRA and DOE Declared emergencies, as appropriate. During DOE declared emergencies, the shaded duties are required to be implemented. Maintain a log of your activities, conversations and both directives given and received. Ensure that a log of RCT activities is maintained.

1. ___ Upon notification, and after receiving safe routes of travel, report to the assigned location.

   | |
   |---|
   | Specifically request the location and any pertinent information related to personnel who may have received a radiological exposure. |

2. ___ Ensure the following initial tasks are completed:

   - Perform initial assessment of hazards (i.e., source term identified, stack samples collected)
   - Estimate boundary of plume
   - Identify radiological constituents
   - Coordinate PPE requirements for personnel entering plume
   - Assist in development of monitoring requirements to detect radiological material
   - Understand known radiological and weather conditions
   - Consider physical source term (steam, pressure systems, etc.).

3. ___ Establish monitoring to ensure initial and ongoing personnel radiological safety throughout incident scene.

   - This should be discussed with the ICP (Hanford Fire Dept.) Safety Officer.

**Exhibit 12.6 – ICP Hazards Assessor Checklist for Hazardous Facilities (contd)**

- Monitor emergency worker exposure.
- Evaluate and determine need to perform habitability surveys throughout the incident scene. Habitability may include dose and contamination surveys, and if applicable, a high volume air sample. Inform the Operations Section Chief of habitability survey results and recommend moving any resources out of an area that is above background.

4. ___ Ensure that RCT resources are available to the Operations Section Chief to perform ingress and egress surveys as required.

5. ___ Support survey teams as required, providing safe routes of travel, recommended PPE, and necessary monitoring equipment.

6. ___ In conjunction with the Operations Section Chief, ensure that RCTs are available to control access, monitor for, and post the boundary of the radiological plume within the affected facility. If a plume is found, assure appropriate grab air samples are taken. Control access, monitor, and post the boundary of the radiological plume within the affected facility boundary.

   - If the release is projected to go beyond the affected facility boundary, the event has likely required an RL-EOC activation, and will require implementation of RLEP 3.16, Hanford Plume Assessment and Tracking.

7. ___ Provide radiological control support for mitigation activities throughout the event's duration.

8. ___ Ensure processing of potentially contaminated personnel inside the affected facility's boundary.

   - If the number of contaminated personnel exceeds available decontamination capability, initiate a response in accordance with RLEP 3.17, Large Group Survey Sort and Decontamination.
   - If there is an injured and contaminated worker that needs transportation to a local hospital, ensure that the POC is notified. The POC will in turn contact the HEHF On-Call Physician to implement RLEP 3.18.
   - If there is a contaminated/deceased worker, assure that a recovery and decontamination plan is developed as described in RLEP 3.19.

**Exhibit 12.6 – ICP Hazards Assessor Checklist for Hazardous Facilities (contd)**

9. ___ Provide radiological control support for contaminated and injured personnel (facility Radiological Control Technician is to accompany personnel to hospital in ambulance).

10. ___ IF the incident involves a transportation incident on the Site,

    THEN attempt to locate shipping papers or manifests to ensure the contents of the shipment can be verified.

11. ___ Review safety and health issues, concerns, and survey priorities with the survey team members.

12. ___ Ensure the data received has been converted to factor in the efficiency of the instrument or measurement (i.e., cpm to dpm, and air samples in mCi/cc).

13. ___ Assure that communication of incident scene radiological data with UDAC Hazards Communicator includes maps or drawings of the affected scene.

14. ___ Participate in ICP briefings as required.

### 12.6.2 Part 2, Chemical

This position is filled by an Industrial Hygienist assigned to the HFD (HFD may use facility IH personnel if available until HFD IH personnel arrive), in support of the HFD HazMat Team HFD-Medical Staff, and HFD-Safety Officer who will provide technical expertise in chemical and toxicological hazard identification, evaluation, reactivity and dispersion modeling at the incident scene. The Industrial Hygienist may also serve as a chemical/decontamination Safety Officer, if designated by the IC. Activities will be conducted in accordance with this procedure and other internal HFD procedures as applicable. The Hazards Assessor is responsible for implementing the following check listed duties for non-declared, RCRA, and DOE declared emergencies, as appropriate. During DOE declared emergencies, the shaded duties are required to be implemented. This position may be staffed for non-declared, RCRA, and DOE declared emergencies as necessary. Maintain a log of your activities, conversations and both directives given and received.

1. ___ Upon notification, and after receiving safe routes of travel, report to the assigned location.

| |
|---|
| Specifically request the location and any pertinent information related to personnel who may have received a chemical exposure. |

## Exhibit 12.6 – ICP Hazards Assessor Checklist for Hazardous Facilities (contd)

2. ___ Support the Operations Section Chief to provide chemical monitoring for purposes of initial hazard evaluation ("size up") to ensure protection of emergency responders, ICP habitability, and to monitor habitability changes in the incident scene.

3. ___ Recommend and execute chemical sampling strategies for purposes of incident characterization, determination of employee exposure, and subsequent analysis of the incident.

4. ___ IF the incident involves a transportation incident on the Site:

   THEN attempt to locate shipping papers or manifests to ensure the contents of the shipment can be verified.

5. ___ Obtain a Material Safety Data Sheet (MSDS) for the involved chemical(s) and ensure a copy is provided to the HFD Medical Staff.

6. ___ In conjunction with the Radiological Hazards Assessor, make recommendations on respiratory protective equipment and other PPE for chemical and physical hazards to the ICP (Hanford Fire Department) Safety Officer.

7. ___ Support the HFD in the on-scene assessment and methodology for decontamination of ambulatory and non-ambulatory patients and/or equipment when the event involves chemical or mixed hazards.

8. ___ Recommend additional resource needs (IH support, equipment or PPE) to the Operations Section Chief.

9. ___ Address safety and health issues of emergency response team.

10. ___ Communicate with the IC, BED, HazMat Team, Safety Officer and others as necessary.

11. ___ Participate in ICP briefings as required.

12. ___ Throughout the incident and as information becomes available, communicate with the ICP Hazards Communicator for the purpose of providing information to the UDAC.

## Exhibit 12.7 – Staging Area Supervisor Checklist

The Facility Staging Area Manager is responsible for coordination of actions at the facility staging area. This position is staffed by a facility representative. The list below is not designed to be all encompassing, nor is it necessary to perform each of these actions in sequence. The Facility Staging Area Manager is responsible for implementing the following check listed duties for non-declared, RCRA, and DOE declared emergencies, as appropriate. Maintain a log of your activities or assign a log keeper.

1. ___ Upon notification of an emergency event requiring facility personnel to evacuate, proceed to the 325 Building staging area with the appropriate tools and information to perform the Staging Area Supervisor duties. Obtain PNAD sign-out sheet at the receptionist desk when exiting the facility to provide an accounting of visitors to the facility.

2. ___ Verify through the BED that the staging area is in a safe location.

3. ___ Segregate personnel in personal protective equipment (PPE) and direct RCTs to survey personnel in PPE.

4. ___ Collect Building Occupancy/Accountability status from Zone Wardens at staging area. (DO NOT re-enter the facility).

5. ___ Query staff at staging area to determine if hazardous processes are on-going in the facility.

6. ___ Determine if any personnel were injured or potentially exposed to hazardous materials. Communicate any positive responses to the BED

7. ___ Contact the BED to determine if the Northwest corner of the RPL needs to be manned.

   - Assign a Zone Warden to man the Northwest corner of RPL if necessary to control re-entry to the facility.

8. ___ Update personnel on the event status on a periodic basis.

9. ___ If notified to evacuate, identify all personnel with vehicle keys in their immediate possession. Match up people with rides. Verify destination and route with each driver.

10. ___ Use government vehicles to transport personnel in PPE, if required. Reserve vehicles for personnel with late shutdown duties.

**Exhibit 12.7 – Staging Area Supervisor Checklist (contd)**

11. ___ In the event of an extended building evacuation during inclement weather, direct personnel to utilize the 3760 Building (old PNNL library) as an alternate staging areas.

12. ___ Perform turnover with the fire department staging officer upon his arrival to cover all information listed above.

## Exhibit 12.8 – Zone Warden Checklist

1. ___ For your zone determine if all personnel have left:

   - their assigned work areas in the facility
   - unoccupied spaces, such as stairwells, corridors, elevators, and closets.

2. ___ Perform a thorough room-by-room search (if safe to do so) to provide a high degree of assurance that the facility is free of personnel.

3. ___ Report the occupancy/accountability status to the Staging Area Supervisor and determine if aid or rescue is required.

4. ___ Ensure that disabled persons receive whatever assistance may be required for a safe and orderly evacuation.

## Exhibit 12.9 – Handling of Radiologically Contaminated/Deceased Worker Checklist

1. ___ Assure a plan is developed to assess victim(s) and surrounding area contamination levels, without compromising the event scene evidence.

2. ___ If the Emergency Operations Center (EOC) is activated, assure that victim and event scene data is communicated to the EOC and Unified Dose Assessment Center as described in RLEP 1.1. If not activated, assure that the victim and event scene information is communicated to the Occurrence Notification Center (ONC). Assure that the ONC informs the Department of Energy Senior Management Duty Officer, on-call HEHF Physician, Employee Health Advocate for PHMC contractors, and the appropriate points of contact for all other contractors.

3. ___ Upon the Coroners arrival, provide a briefing on radiological conditions and proper personal protective equipment required (if necessary) to enter the area of the victim(s).

4. ___ Discuss and implement a plan to decontaminate the victim with input from coroner, event contractor Human Resources, and Radiation Protection as a minimum. The plan should consider the following factors:

    - Determine mutually agreeable level of decontamination (Non detectable or ALARA) Consider the residual radiation level 30 centimeters from the body, and/or where the radioactivity is found on or in the deceased worker.
    - Determine with assistance from the event contractor Human Resources if there are any societal, religious, and/or cultural implications.
    - Request input from the Radiation Protection organization concerning the application of the NCRP 37 and 65 recommendations.
    - Consider the type and composition of casket and funeral (open or closed casket), if known.
    - Consider movement of deceased worker when appropriate.
    - Consider cold storage if decontamination cannot be readily completed.
    - Arrange for disposition and disposal of contaminated biological wastes.
    - Consider the radiological, biological, and other hazards to attending personnel.

## Exhibit 12.9 – Handling of Radiologically Contaminated/Deceased Worker Checklist (contd)

- Determine method(s) of decontamination (consider use of the Hanford Fire Department Mobile Decontamination Facility).
- Evaluate the event investigation implications.

5. ___ Assure decontamination of the victim is completed in accordance with the decontamination plan.

6. ___ Move the victim to appropriate staging area if in a radiation or contamination area, while awaiting transportation to designated funeral home.

7. ___ Clean the area and handle, label, and dispose of the decontamination waste as biological hazardous material. The waste is disposed as radiological waste but labeled as biological hazardous material.

8. ___ Assure that the HEHF psychologist is notified and dispatched to address the workers who decontaminated the worker and were involved in the incident, if needed.

9. ___ Maintain a chronological log of all interfaces and activities. Collect and maintain copies of documentation and activity logs from the event.

## Exhibit 12.10 – Emergency Checklist for Emergency Management Support Group

The Management Support Group will use the following checklist to support the BED in managing the administrative aspects of the event.

| Item | Yes | No | Comment |
|---|---|---|---|
| Has 375-2400 been notified? | | | |
| Have all building occupants been accounted for?<br>PNNL staff?<br>PNNL visitors?<br>Other Contractor personnel?<br>Consultants, vendors, others? | | | |
| Have any persons received injuries or been subjected to conditions requiring medical attention?<br>If Yes, has medical attention been arranged? | | | |
| Has the BED classified the event?<br>Alert<br>Site<br>General | | | |
| Has activation of the EOC been requested? | | | |
| Do any persons require medication for non-event Reasons (e.g., heart medicine)? | | | |
| Has access control been initiated by Patrol? | | | |
| Has the Area Operations Manager/Facility Manager been notified? Has he reported to the event scene? | | | |
| Has a location for the ICP been established? | | | |
| Has location for the Management Support Group Been established and communicated to the HFD, HP, and the EOC? | | | |
| Has an open line to the EOC been established?<br>(EOC PNNL Technical Support Representative: 376-7148) | | | |
| Has the Emergency Duty Officer made contact With the BED? | | | |
| Has event log been set up? | | | |
| Are additional staff required for support?<br>Clerical<br>Technical?<br>Other? | | | |

**Exhibit 12.10 – Emergency Checklist for Emergency Management Support Group (contd)**

| Item | Yes | No | Comment |
|---|---|---|---|
| Has the Incident Commander established a schedule for periodic briefings? | | | |
| Are additional RCTs required? | | | |
| Is there a need for a facility inventory?<br>Chemical-hazardous, toxic, flammable?<br>Radio chemical?<br>Nuclear or fissile material?<br>If inventory information is required, contact the following:<br>Chemical inventory – 376-0812<br>– 372-1043 or 375-6315<br>Nuclear/fissile – Safeguards & Security<br>Duty Officer or Cognizant operations staff | | | |
| Has Public Relations been notified? | | | |
| Has DOE Headquarters been notified? | | | |
| Has EOC contacted other facilities not immediately involved? | | | |
| Is technical or operational spokesperson needed?<br>If so, has he/she been contacted? | | | |
| Has Program Manager been notified? | | | |
| Will relief staff be required for the Incident Command Post (Event and Support Teams)? | | | |
| Is transportation needed?<br>Available? | | | |
| Is there a need for additional equipment or supplies (including food)? | | | |
| Has PNNL Security made arrangements with Patrol for access of special equipment (radios, cellular telephones)? | | | |
| Are additional radiation instruments required?<br>What type?<br>How many of each type? | | | |
| Is the Hazardous Materials (HazMat) team needed? | | | |

## Exhibit 12.11 – Facility Operations Specialist – Check-Listed Duties

The individual, when assigned by the BED, is responsible to ensure that immediate mitigative actions that cannot be delayed without threatening human health and/or the environment, are taken at the event scene. The Facility Operations Specialist (FOS) is responsible for meeting emergency responders at the event scene and providing information on event status and initial actions that are underway. This position is normally filled by the BED or his/her designee. The FOS is responsible for implementing the following check listed duties for non-declared, RCRA, and DOE declared emergencies, as appropriate. Maintain a log of your activities, conversations and directives given and received.

1. ___ Obtain briefing on operational/mitigative activities and obtain any necessary facility specific procedures, utility disconnects, etc.

2. ___ Following BED briefing, and after receiving safe routes of travel, respond to a safe location upwind of the event scene.

   - Ensure personnel who were in the immediate area are accounted for and located in a safe, upwind area
   - Ensure that first aid is administered as-soon-as possible
   - Begin segregation of any contaminated personnel.

3. ___ Meet emergency personnel responding to the event scene and provide information on event status and initial actions underway. Collocate with the HFD/Hanford Patrol Operations Section Chief upon their arrival and act as the facility point-of-contact at the incident scene hazard area.

4. ___ Assist the HFD/Hanford Patrol Operations Section Chief with development of a mitigation plan by providing facility expertise.

5. ___ Identify, contact, and supervise additional facility personnel as required to Support Operations Section activities.

Coordinate with HFD/Hanford Patrol Operations Section Chief to ensure that all facility emergency responders are wearing appropriate PPE for assigned tasks.

# Exhibit 12.12 -- RL Emergency Notification Form

RL-F-5540.1
(02/99)

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

## NOTIFICATION FORM

Notification No.

1 NOTIFICATION PROVIDED BY: Name: ______________ Phone: (509) ______

2 AREA AND FACILITY: ______________

3 TYPE EVENT: a. ☐ Emergency b. ☐ Exercise/Drill

4 CLASSIFICATION/STATUS:

a. ☐ Initial Classification b. ☐ Reclassification c. ☐ Termination d. ☐ PAR Change/Addition e. ☐ Information

5 EMERGENCY CLASSIFICATION LEVEL AND PROTECTIVE ACTION RECOMMENDATIONS:

| AREA | a. ☐ ALERT EMERGENCY | b. ☐ SITE AREA EMERGENCY | c. ☐ GENERAL EMERGENCY |
|---|---|---|---|
| ☐ 100K | Evacuate Columbia River from White Bluffs to Vernita Bridge. | Evacuate Columbia River from White Bluffs to Vernita Bridge. | • Evacuate Columbia River from White Bluffs to Vernita Bridge.<br>• Evacuate Section 5, east of Hwy. 24. |
| ☐ 200 | None | Evacuate Columbia River from Vernita to Leslie Groves Park. | • Evacuate Columbia River from Vernita to Leslie Groves Park.<br>• Evacuate Sections 5, 6, and 7. |
| ☐ 300 | None | Evacuate Columbia River from White Bluffs to Howard Amon Park. | • Evacuate Columbia River from White Bluffs to Howard Amon Park.<br>• Evacuate 3 mile radius. |
| ☐ 400 | None | Evacuate Columbia River from White Bluffs to Leslie Groves Park. | Evacuate Columbia River from White Bluffs to Leslie Groves Park. |
| ☐ Others | None | None | None |

6 TYPE OF INCIDENT: *check all that apply*

a. ☐ Fire b. ☐ Explosion c. ☐ Radiological d. ☐ Security e. ☐ Hazardous Materials f. ☐ Electrical

g. ☐ Other EAL Used for Classification: DOE-0223, RLEP 1.0, Appendix 1-

Description of Incident: ______________

7 RELEASE INFORMATION:

a. ☐ No Release
b. ☐ Airborne Release
c. ☐ Spill
d. ☐ Release to Columbia River
e. ☐ Unknown
f. ☐ Release Terminated

Estimated Start Time of Release ______

Assumed Duration of Release ______

8 METEOROLOGICAL DATA:

Wind Speed ______ mph

Wind Direction: from ______ toward ______

Precipitation: ☐ Yes ☐ No

Stability Class:

A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐

9 PROGNOSIS OF SITUATION:

a. ☐ Unknown b. ☐ Stable c. ☐ Escalating d. ☐ Improving

### FOR EOC USE ONLY

10 ADDITIONAL OFFSITE PROTECTIVE ACTION RECOMMENDATIONS:

______________

11 BASIS FOR ADDITIONAL OFFSITE PROTECTIVE ACTION RECOMMENDATIONS:

a. ☐ Security c. ☐ Hazardous Materials Release

b. ☐ Facility Condition d. ☐ Other ______

APPROVED: ______ DATE: ______ TIME: ______

## Exhibit 12.13 – Emergency Closeout – Check-Listed Duties

The following emergency closeout check listed items are to be referred to by the BED, Operations Section Chief, FOS, and the IC before recommending termination of a declared emergency.

ICP Initials

1. ___ Initiating condition is (circle one): a) Stabilized b) Corrected

   - Damage to facilities and/or process-related systems and equipment are stabilized or corrected, and there is a high probability that it can be maintained in that condition.
   - Radiation or hazardous material exposure levels within the affected facility are corrected, stable or decreasing with time.
   - Injured personnel have been properly treated and/or transported to medical facilities.

2. ___ Radiation or hazardous material exposure levels within the affected facility or area(s) are stable or decreasing with time.

3. ___ Fire, flood, earthquake, or similar emergency conditions no longer constitute a hazard to critical systems/equipment or to personnel.

4. ___ Security of the affected facilities is controlled.

5. ___ Release of hazardous material offsite or beyond controlled areas onsite have ceased or are controlled within permissible regulatory limits, and the potential for an uncontrolled release is low.

6. ___ Access control has been established to prevent inadvertent or uncontrolled entry into (1) the event scene and (2) facilities and areas that were contaminated during the event.

7. ___ Existing conditions no longer meet the established Emergency Action Levels for the facility/site, and it appears unlikely that conditions will deteriorate.

**Note:** The following emergency closeout checklist items are to be referred to by the RL-EOC Site Emergency Director prior to recommendation to terminate.

# Appendix A

# DOE-0233 Recognizing and Classifying Emergencies
# RLEP 1.0 – Appendix 1-PNNL.325

# Appendix A

# DOE-0233 Recognizing and Classifying Emergencies RLEP 1.0 – Appendix 1-PNNL.325

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## A.2 Facility Emergency Events

**Table 1A.** Generic Emergency Classification Criteria (ALERT)

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Classification criteria for Alert Level Emergency (any degradation of safety not otherwise directly covered in other specific EALs) | An Alert Level Emergency shall be declared when events are in progress or have occurred that involve an actual or potential substantial degradation of the level of safety of the facility, <br>**OR**<br> Substantial actual/potential degradation of level of protection or the loss or potential loss of special nuclear material (SNM) <br>**OR**<br> If you need assistance from the RL Emergency Operations Center to mitigate the event, or if you anticipate that Alert emergency conditions are imminent, declare an Alert. | **ALERT EMERGENCY** |
| The information below is for the Unified Dose Assessment Center use only | | |
| Classification criteria for Alert Level Emergency (any degradation of safety not otherwise directly covered in other specific EALs) | Any release of radioactive or chemical material meeting the following criteria: RADIOACTIVE MATERIAL RELEASE: Projected dose greater than a 100 mrem total effective dose equivalent, calculated at the facility boundary, <br>**OR**<br> Chemical Material Release: <br> Exposure limits (air concentrations) greater than ERPG-1 but less than ERPG-2 at the facility boundary. | **ALERT EMERGENCY** |

**Table 1A.** Generic Emergency Classification Criteria (SITE AREA)

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Classification criteria for a Site Area Emergency (and degradation of safety not otherwise directly covered in other specific EALs) | A Site Area Emergency shall be declared when events are in progress or have occurred that involve actual or likely major failures of facility functions needed for protection of workers and the public<br>**OR**<br>Actual malevolent acts resulting in major failures of protective systems. | **SITE AREA EMERGENCY** |
| The information below is for the Unified Dose Assessment Center use only. | | |
| Classification criteria for a Site Area Emergency (any degradation of safety not otherwise directly covered in other specific EALs) | Any release of radioactive or chemical material meeting the following criteria:<br>RADIOACTIVE MATERIAL RELEASE:<br>Projected dose greater than a rem total effective dose equivalent, calculated at the facility boundary.<br>**OR**<br>Chemical Material Release:<br>Exposure limits (air concentrations) greater than ERPG-2 at the facility boundary, but less than ERPG-2 at the Hanford Site boundary. | **SITE AREA EMERGENCY** |

**Table 1A.** Generic Emergency Classification Criteria (GENERAL)

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Classification Criteria for a General Emergency (any degradation of safety not otherwise directly covered in other specific EALs) | A General Emergency shall be declared when events are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with a potential for loss of confinement or containment integrity<br>**OR**<br>Malevolent action resulting in catastrophic degradation of protection systems that could lead to substantial offsite impacts. | **GENERAL EMERGENCY** |
| The information below is for the Unified Dose Assessment Center use only. | | |
| Classification Criteria for a General Emergency (any degradation of safety not otherwise directly covered in other specific EALs) | For any release of radioactive or chemical material meeting the following criteria:<br>RADIOACTIVE MATERIAL RELEASE: Projected dose greater than a 1 rem total effective dose equivalent, calculated at the Hanford Site boundary<br>**OR**<br>Chemical Material Release:<br>Exposure limits (air concentrations) greater than ERPG-2 at the Hanford Site boundary. | **GENERAL EMERGENCY** |

**Table 1B.** Facility Fire

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| 325 Building Fire | A fire discovered within the 325 Building, with potential for affecting facility safety<br>AND<br>Has exceeded facility fire suppression system capability<br>AND<br>Requires Hanford Fire Department action for suppression. | ALERT EMERGENCY |
| A fire with a stack alarm | Fire affecting facility safety occurs with failure of all stages of HEPA filtration, as indicated by a confirmed 325 Bldg stack monitor alarm. | SITE AREA EMERGENCY |
| A 325 Building related fire | Events are in progress or have occurred that involve actual or imminent catastrophic failure of facility confinement or containment integrity. | GENERAL EMERGENCY |

**Table 1C.** Facility Explosion

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| A process explosion occurs. | Confirmed 325 Building explosion requiring evacuation of entire 325 Building. | ALERT EMERGENCY |
| A process explosion occurs. | Confirmed explosion within the 325 Bldg which has failed or threatens facility integrity. | GENERAL EMERGENCY |

NOTE: No Site Area Emergency class defined.

**Table 1D.** Loss of Radioactive Material Confinement

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Hot Cell barrier degradation | An unplanned/uncontrolled breach of the 325A/B Hot cells, as indicated by:<br>325 A/B Cell high pressure alarm<br>**AND**<br>Adjacent operation gallery CAM alarms<br>**OR**<br>325 Building stack monitor alarm. | **ALERT EMERGENCY** |
| Glovebox wall degradation | An unplanned/uncontrolled breach of a glovebox containing radiological materials, as indicated by:<br>Glovebox high pressure alarm<br>**AND**<br>Adjacent Laboratory CAM alarms<br>**OR**<br>325 Building stack monitor alarm. | **ALERT EMERGENCY** |
| Hot cell barrier degradation | An unplanned/uncontrolled breach of the 325 A/B Hot cells with resulting airborne release<br>**AND**<br>HEPA filtration system is not operational, or an alternate exhaust pathway to the exterior of the building exists. | **GENERAL EMERGENCY** |

**NOTE:** No Site Area Emergency class defined.

**Table 1E.** Hazardous Material Release

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Unknown release of hazardous/toxic material | Any release of hazardous/toxic material to the building atmosphere which causes immediate adverse effects to building personnel<br>**AND**<br>Requires building evacuation. | **ALERT EMERGENCY** |

**NOTE:** No Site Area Emergency class defined.

**Table 1F.** Criticality

| Initiating Conditions | Emergency Action Level | Event Classification |
|---|---|---|
| Potential criticality event | Uncontrolled criticality event is judged likely by Facility Management and a Criticality Safety Engineer. | **ALERT EMERGENCY** |
| Potential criticality event | Criticality alarm annunciates<br>**AND**<br>Criticality event is confirmed by Health Physics or Operations personnel by indication of increase radiation readings or positive quick sort results. | **GENERAL EMERGENCY** |

**NOTE:** No Site Area Emergency class defined.

**Table 1G.** Stack Release

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| 325 Building stack release is confirmed. | A stack monitor alarm with confirmed monitor readings at or above the following levels:<br><br>Gross alpha as Pu-239 493 cps<br>Gross Beta as Sr-90 1,380,000 cps<br>Tritium as HTO 4,350 Ci in 2 hours | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

**Table 1H.** Loss of Service Systems

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Loss of electrical power | Normal power and both the alternate and preferred standby power supplies are unavailable through E3-59 substation for greater than 30 minutes. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

## A.3 Natural Emergencies

**Table 2A.** Seismic Event

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| A seismic event occurs. | A seismic event is felt by personnel, with some breakage of windows and disturbance of tall objects at the 300 Area. | **ALERT EMERGENCY** |
| A seismic event occurs. | A seismic event is felt by personnel with evidence of falling debris within the 325 Building. | **SITE AREA EMERGENCY** |
| A seismic event occurs. | A seismic event causes severe building damage (walls fall, underground pipes broken, ground cracked) within or adjacent to the 325 Building. | **GENERAL EMERGENCY** |

**Table 2B.** High Winds/Tornado

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| High winds within the 300 Area | Sustained high winds greater than or equal to 90 mph observed at the 325 Building and which have caused extensive damage. | **ALERT EMERGENCY** |
| A tornado strikes within the 300 Area. | Tornado visually seen striking the 325 Building causing extensive damage to physical barriers or HEPA filtration system. | **GENERAL EMERGENCY** |

**NOTE:** No Site Area Emergency class defined.

**Table 2C.** Range Fire

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Range fire | A range fire has entered the 300 Area and has or is likely to enter the 325 Building. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

## A.4 Security Contingencies

**Table 3A.** Explosive Device

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Explosive device | A confirmed explosive device is located within the 325 Building. | **ALERT EMERGENCY** |
| Explosive device | A confirmed detonation of an explosive device within the 325 Building which has failed or threatens facility integrity. | **SITE AREA EMERGENCY** |
| Explosive device | A confirmed detonation of an explosive device within the 325 Building rooms containing hazardous materials and which has failed or threatens facility integrity. | **GENERAL EMERGENCY** |

**Table 3B.** Sabotage

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Confirmed sabotage | Credible or confirmed physical damage to any safety system within the 325 Building as a result of sabotage. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

**Table 3C.** Hostage Situation

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Hostage situation | A confirmed hostage situation involving personnel is occurring within the 325 Building. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

**Table 3D.** Armed Intruder/Security Threat

| Initiating Condition | Emergency Action Level | Event Classification |
|---|---|---|
| Armed intruder(s) security threat | Confirmed armed intruder(s) located in the 300 Area. | **ALERT EMERGENCY** |
| Security threat | Credible threat or ongoing severe security compromise involving physical attack on the 325 Building. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

**Table 3E.** Aircraft Crash

| Initiating Condition | Emergency Action Level | Event Condition |
|---|---|---|
| Aircraft crash | An aircraft crash has occurred at or near the 325 Building, which has or is likely to have an adverse affect of the Building's safety, or has/is likely to release radioactive or hazardous materials. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

**Table 3F.** Special Nuclear Material Incident

| Initiating Condition | Emergency Action Level | Event Condition |
|---|---|---|
| Special Nuclear Material (SNM) incident. | Confirmed diversion or theft of SNM at the 325 Building. | **ALERT EMERGENCY** |

**NOTE:** No Site Area or General Emergency class defined.

## A.5 Definitions

**American Industrial Hygiene Association (AIHA):** The organization that has responsibility for the development of exposure limits for non-radiological hazardous material.

**Area:** The designated administrative boundary intended for support of 300 Area missions.

**Emergency action level (EAL):** EALs originate from generic classification descriptions and are more specifically written for each hazardous facility, based upon specific, predetermined, observable indicators used to detect, recognize and determine the emergency class for operational emergencies. EALs can be an instrument reading; an equipment status indicator; a measurable parameter, onsite or offsite; a discrete, observable event; results of analysis; or other observed phenomenon indicative of an emergency class declaration.

**Emergency Response Planning Guideline (ERPG):** ERPGs are developed by the American Industrial Hygiene Association (AIHA) to determine the appropriate emergency class for releases of non-radiological material. These guidelines will be used as the basis for non-radiological material releases. ERPG-1 and ERPG-2 exposure limits serve as emergency class indicators for the Hanford Site when available from the AIHA.

**ERPG-1** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor (AIHA, 1990).

**ERPG-2** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action (AIHA, 1990).

**Event**: As used in this procedure an event is an adverse condition that requires mitigative responses and may result in the declaration of an emergency.

**Event Classifications**: Establishes correlation of initiating conditions and event indicators with projected onsite and offsite consequences. For a description of the three types of event classification referred to as "Emergencies," see Table 1A.

**Facility boundaries**: The facility boundary may include any process building or hazardous materials handling facility's exterior walls, engineered containment, perimeter fences, barricades or barriers and at a distance of 100 meters from the exterior walls.

**Hanford Site boundary**: For the purposes of emergency preparedness, the Hanford Site is defined as the near (south and west) bank of the Columbia River from the intersection of the existing western most site boundary and the Columbia River, following the Columbia River to the south boundary of the 300 Area, and proceeding west and north along the existing site boundary. Based on this definition, portions of the existing Hanford Site that fall within Grant and Franklin Counties are considered outside of the site boundary.

**Initiating condition**: Operational status which may indicate a potential condition requiring emergency response.

**Total Effective Dose Equivalent**: The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). Deep dose equivalent to the whole body may be used as effective dose equivalent for external exposures.

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# Appendix B

# 300 Area Protective Actions

# Appendix B

# 300 Area Protective Actions

## B.1 Alert Emergency

1. Assure that all affected facility personnel "take cover" or evacuate.

2. Verify that the POC completes the following items contained in the 300 Area checklist for Alert Emergencies:

   - Activates 300 Area's Emergency Alerting System

   - Crash alarm message to "take cover" provided to 300 Area, and all 600 Area residents in areas adjacent to the incident scene

   - Restricts access at WNP-1 Access Road and Route 4S, and at the Horn Rapids intersection with George Washington Way and Horn Rapids intersection with Stevens Drive

3. Plan for subsequent 300 Area evacuation as required.

## B.2 Site Area/General Emergency

1. Verify that all Alert Emergency protective actions are implemented.

2. Plan for area evacuation (RL-EOC will provide evacuation instructions).

3. Verify that the POC has initiated Columbia River Alerting.

# Appendix C

# Hazards Assessment

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# Appendix C

# Hazards Assessment

## Table of Contents

## Figures



## Tables

## C.1 Introduction

This report documents the emergency preparedness hazards assessment for the 325 Building located in the 300 Area of the U.S. Department of Energy (DOE) Hanford Site. The 325 Building Applied Chemistry Laboratory is part of the Pacific Northwest National Laboratory (PNNL), operated by Battelle Memorial Institute under contract to DOE.

This hazards assessment was conducted to provide the emergency planning technical basis for the facility. DOE Order 5500.3A requires that an emergency planning hazards assessment be performed for each facility that has the potential to reach or exceed the lowest level emergency classification.

Much of this document was taken from a draft Safety Analysis Report (PNL-7748) for the 325 Building. This Safety Analysis Report (SAR) will be reformatted to comply with DOE 5480.22 and DOE 5480.23 before formal issue but was used as a basis for this hazards assessment since it is the most complete and current safety analysis of the building. The draft SAR is referred to as PNL-7748 in the remainder of this document.

## C.2 Building Description

Detailed descriptions of the Hanford Site and the 325 Building are found in the Hanford Site characterization document (Cushing 1992) and PNL-7748. The following brief summary is derived from those descriptions.

### C.2.1 Facility Mission

The 325 Building Applied Chemistry Laboratory is a general purpose, nuclear research and development laboratory. The building provides specially shielded, ventilated, and equipped laboratories for radiochemical analyses and nuclear process development studies. Because the 325 Building is a Research and Development (R&D) facility, the work being done in the building changes as programs are concluded and others are started.

### C.2.2 Location

The 325 Building is located in the southern part of the 300 Area (Figure C.1) of the DOE Hanford Site. The nearest site boundary (the 300 Area fence) is 580 meters east of the 325 Building. The nearest possible resident is 1600 meters east across the Columbia River.

The 300 Area is located in the south-eastern corner of the 560 square mile DOE Hanford Reservation in the south central part of the State of Washington along the west bank of the Columbia River (Figure C.2). The size of the Hanford Site will be reduced in 1994. The new boundary will likely be the Columbia River on the north and highway 240 on the south. In addition to the 300 Area, the Hanford Site contains the following major facilities or activities: six reactor areas designated 100-B/C, 100-N,

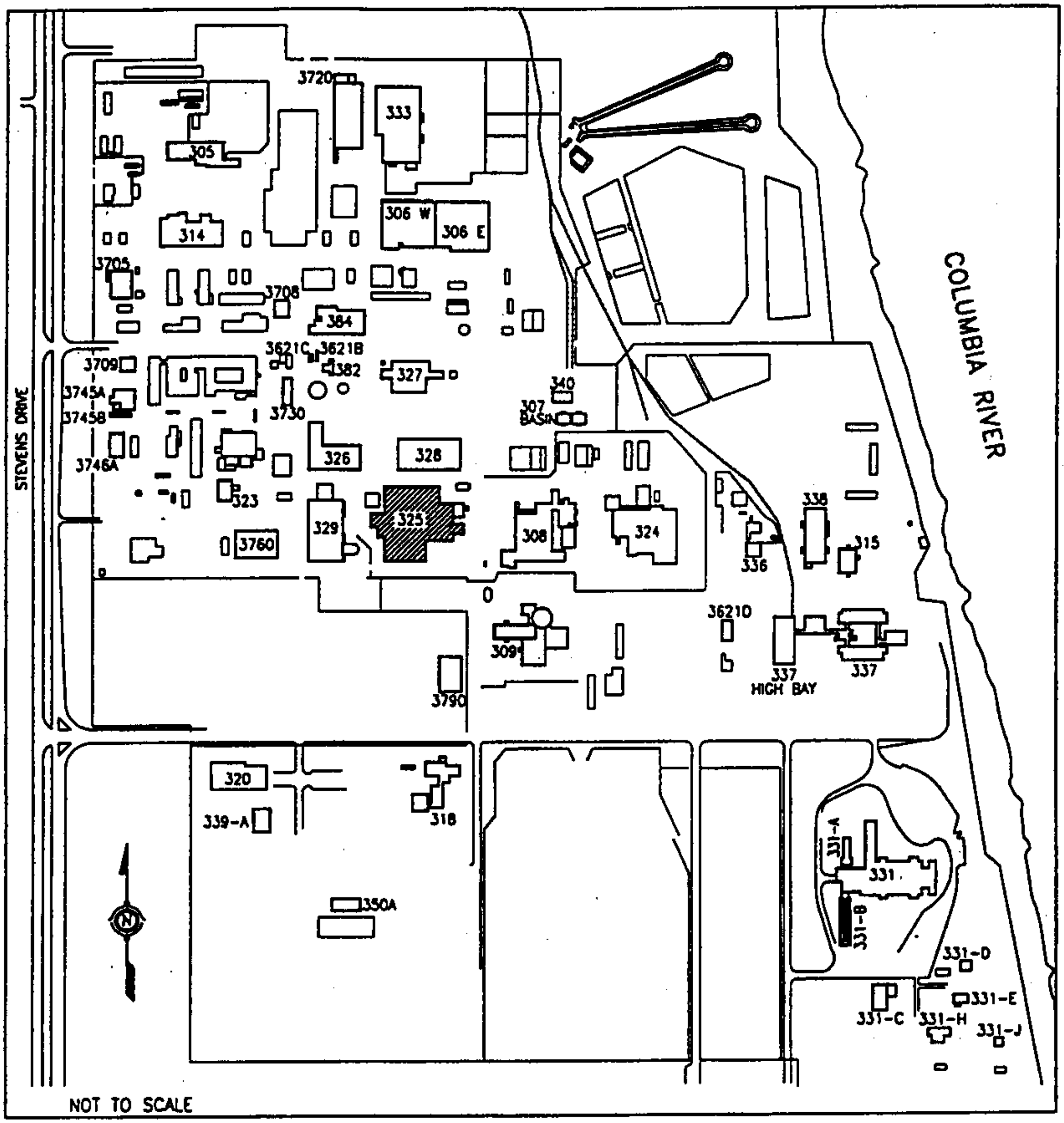


Figure C.1. 300 Area

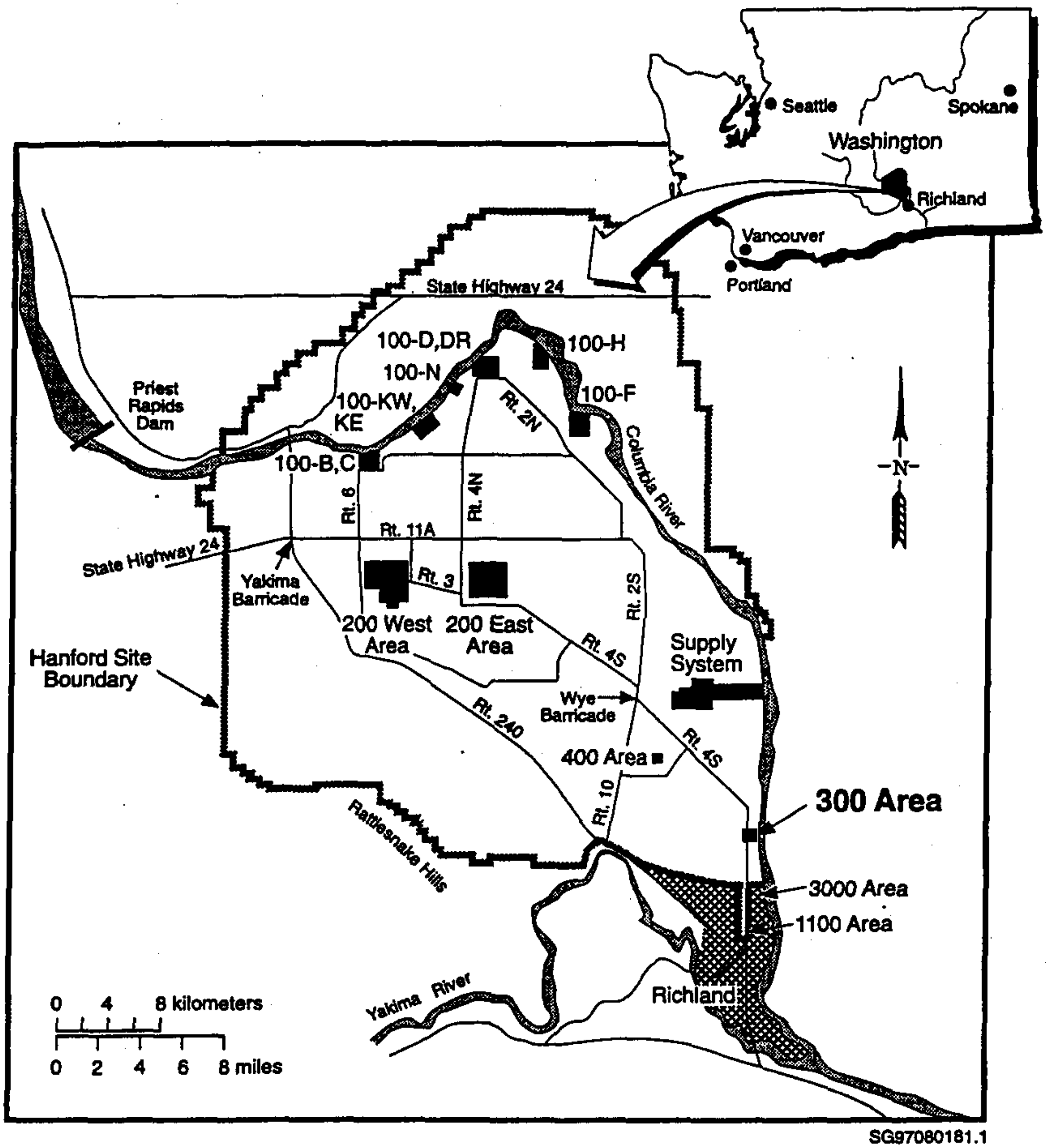


**Figure C.2.** Hanford Site Location

100-KE/KW, 100-D/DR, 100-H, and 100-F, which contain eight shutdown production reactors and one shutdown dual purpose reactor (N Reactor); two areas for waste processing and waste storage designated 200-E and 200-W Areas; a commercial nuclear waste burial operation on land leased to the State of Washington; the shutdown Fast Flux Test Facility (FFTF); and an operating Washington Public Power Supply System nuclear power plant. Major metropolitan areas within the broad vicinity of Hanford include Spokane, Washington, about 120 air miles to the northeast; Seattle, Washington, about 130 air miles to the northwest; and Portland, Oregon, about 150 air miles to the southwest. Two other areas of significant population density include Moses Lake, Washington, about 30 miles north of the K-area and the Yakima Valley, in Washington, extending from Yakima, about 45 miles west of Hanford, to the Tri-Cities, in Washington. The nearest of the Tri-Cities, Richland, is immediately south of the 300 Area.

#### C.2.2.1 Floods

Large Columbia River floods have occurred in the past (DOE 1987), but the likelihood of recurrence of large-scale flooding has been reduced by the construction of several flood control/water storage dams upstream of the Site. Major floods on the Columbia River are typically the result of rapid melting of the winter snow pack over a wide area augmented by above-normal precipitation. The maximum historical flood on record occurred June 7, 1894, with a peak discharge at the Hanford Site of 21,000 cubic meters per second (cms) (742,000 cubic feet per second (cfs). The 325 Building is not in the flood plain associated with the 1894 flood. The largest recent flood took place in 1948 with an observed peak discharge of 20,000 cms (706,280 cfs) at the Hanford Site. The probability of flooding at the magnitude of the 1894 and 1948 floods has been greatly reduced because of upstream regulation by dams.

There are no Federal Emergency Management Agency (FEMA) flood plain maps for the Hanford Reach of the Columbia River. FEMA only maps developing areas, and the Hanford Reach is specifically excluded.

There have been fewer than 20 major floods on the Yakima River since 1862 (DOE 1986). The most severe occurred in November 1906, December 1933, and May 1948; discharge magnitudes at Kiona, Washington, were 1,870, 1,900, and 1,050 cms (66,000, 67,000, and 37,000 cfs), respectively. The recurrence intervals for the 1933 and 1948 floods are estimated at 170 and 33 years, respectively. The development of irrigation reservoirs within the Yakima River Basin has considerably reduced the flood potential of the river. The 325 Building is not within lands susceptible to a 100-year flood on the Yakima River.

Evaluation of flood potential is conducted in part through the concept of the probable maximum flood (PMF), which is determined from the upper limit of precipitation falling on a drainage area and other hydrologic factors, such as antecedent moisture conditions, snowmelt, and tributary conditions, that could result in maximum runoff. The probable maximum flood for the Columbia River below Priest Rapids Dam has been calculated to be 40,000 cms (1.4 million cfs) and is greater than the 500-year flood. The PMF would probably surround the 300 area with water (see Figure 4.2-10 in Cushing 1992) but is not expected to inundate the 325 Building. According to projections by the U.S. Corps of Engineers, the

PMF would result in a groundwater level of 116 meters (382 feet) above maximum surface level (msl) at the 325 Building (the ground floor is 123 meters (402 feet) and the basement is 118 meters (387.5 ft) above msl).

The U.S. Army Corps of Engineers (1989) has derived the Standard Project Flood (SPF) with both regulated and unregulated peak discharges given for the Columbia River below Priest Rapids Dam. Frequency curves for both natural (unregulated) and regulated peak discharges are also given for the same portion of the Columbia River. The regulated SPF for this part of the river is given as 15,200 cms (54,000 cfs) and the 100-year regulated flood as 12,400 cms (440,000 cfs). No maps for the flooded areas are given.

Potential dam failures on the Columbia River have been evaluated. Upstream failures could arise from a number of causes, with the magnitude of the resulting flood depending on the degree of breaching at the dam. The U.S. Army Corps of Engineers evaluated a number of scenarios on the effects of failures of Grand Coulee Dam, assuming flow conditions of the order of 11,000 cms (400,000 cfs). For purposes of emergency planning, U.S. Army Corps of Engineers hypothesized that 25% and 50% breaches, the "instantaneous" disappearance of 25% or 50% of the center section of the dam, would result from the detonation of nuclear explosives in sabotage or war. The discharge or flood wave resulting from such an instantaneous 50% breach at the outfall of the Grand Coulee Dam was determined to be 600,000 cms (21 million cfs). In addition to the areas inundated by the probable maximum flood (see Figure 4.2-10 in Cushing 1992), the remainder of the 100 Areas, the 300 Area, and nearly all of Richland, Washington, would be flooded (DOE 1986; see also ERDA 1976). No determinations were made for failures of dams upstream, for associated failures downstream of Grand Coulee, or for breaches greater than 50% of Grand Coulee, for two principal reasons: The 50% scenario was believed to represent the largest realistically conceivable flow resulting from either a natural or human-induced breach (DOE 1986); that is, it was hard to imagine that a structure as large as the Grand Coulee Dam would be 100% destroyed instantaneously. It was also assumed that such a scenario as the 50% breach would only occur as the result of direct explosive detonation, not because of a natural event such as an earthquake, and that even a 50% breach under these conditions would indicate an emergency situation in which there might be other overriding major concerns.

The possibility of a landslide resulting in river blockage and flooding along the Columbia River has also been examined for an area bordering the east side of the river upstream from the city of Richland. The possible landslide area considered was the 75-meters- (250-feet-) high bluff generally known as White Bluffs. Calculations were made for an $8 \times 10^5$ $m^3$ ($1 \times 10^6$ $yd^3$) landslide volume with a concurrent flood flow of 17,000 cms (600,000 cfs) (a 200-year flood) resulting in a flood wave crest elevation of 122 meters (400 feet) above mean sea level. Areas inundated upstream from such a landslide event would be similar to those shown in Figure 4.2-10 of Cushing 1992.

In summary, the 325 Building is above the PMF flood plane and the likelihood of flooding is considered to be quite low. The emergency planning for major failures of upstream dams is beyond the scope of this Hazards Assessment.

### C.2.2.2 Seismology

The Hanford Site is in a region of low to moderate seismicity. The historic record of earthquakes in the Pacific Northwest dates from about 1840. The early part of this record is based on newspaper reports of structural damage and human perception of the shaking, as classified by the Modified Mercalli Intensity (MMI) scale, and is probably incomplete because the region was sparsely populated. Seismograph networks did not start providing earthquake locations and magnitudes of earthquakes in the Pacific Northwest until about 1960.

Large earthquakes (magnitude greater than Richter 7) in the Pacific Northwest have occurred in the vicinity of Puget Sound, Washington, and near the Rocky Mountains in eastern Idaho and western Montana. A large earthquake of uncertain location occurred in north-central Washington in 1872. This event had an estimated maximum MMI ranging from VII to IX and an estimated Richter magnitude of approximately 7. The distribution of intensities suggests a location within a broad region between Lake Chelan, Washington, and the British Columbia border. Seismicity of the Columbia Plateau, as determined by the rate of earthquakes and the historical magnitude of these events, is relatively low when compared to other regions of the Pacific northwest, the Puget Sound area and western Montana/eastern Idaho. In the central portion of the Columbia Plateau, the largest earthquakes near the Hanford Site are two earthquakes that occurred in 1918 and 1973. These two events had magnitudes of 4.4 and intensity V and were located north of the Hanford Site. For more information concerning the seismology and geology of this area, see Section 4.2.3 of the Hanford Site National Environmental Policy Act (NEPA) Characterization (Cushing 1992).

### C.2.2.3 Wind and Tornado

The Site is subject to frequent strong westerly winds. The all-time peak wind recorded at the Hanford Meteorology Station tower in the 200 West area at the 15-m level was a gust of 81 mph recorded January 11, 1972. The 80 mph gust is expected to occur once every 30 years. A peak of 85 mph would be expected to occur once every 100 years (Cushing 1992).

The Site is well outside of established tornado alleys. The probability of a tornado in any year at any point within the 100 mile radius of the Hanford Meteorology Station is $6.8 \times 10^{-6}$/yr (Stone 1972).

### C.2.2.4 Ashfall

The Hanford Site is in a region subject to ashfall from volcanic eruptions. The three major volcanic peaks closest to the project are: Mt. Adams about 100 miles away, Mt. Rainier at about 110 miles away, and Mt. St. Helens approximately 130 miles away.

Important historical ashfalls affecting this location were from eruptions of Glacier Peak about 10,000 BC, Mt. Mazama about 4000 BC, and Mt. St. Helens about 6000 BC. The most recent ashfall resulted from the May 18, 1980 eruption of Mt. St. Helens. Table C.1 below indicates the estimated ash depth deposited at the Hanford Site from past volcanic eruptions in the region.

**Table C.1.** Estimated Ash Depth at Hanford from Major Eruptions

| | | | Equivalent Roof Loading | |
|---|---|---|---|---|
| Volcano | Time | Depth of Ash | Dry (psf) | Wet (psf) |
| Glacier Peak | 12,000 B.P. | 1 in. | 6 | 8.4 |
| Mt. Mazama | 6,000 B.P. | 6 in. | 36 | 50 |
| Mt. St. Helens | 3,600 B.P. | 1 in. | 6 | 8.4 |
| Mt. St. Helens | 1980 | 0.5 in. | 3 | 4.2 |
| B.P. – Before Present | | | | |

## C.2.3 Facility Description

The 325 Building consists of 1) a central portion containing general purpose laboratories for low-level radiochemical work; 2) a south (front) wing containing office space, locker rooms, a lunch room and maintenance shops; and 3) east and west wings provided with shielded enclosures with remote manipulators (hot cells) for high-level radiochemical work. The exhaust fans and final stages of the high-efficiency particulate air (HEPA) filters are housed in a detached structure along the west side of the building at the north end. A storage area for potentially contaminated liquids is located in the vault below ground level along the east side of the building near the north end of the east wing.

The central portion of the building is 59.1 by 59.8 meter (194 by 196 feet) on three floors (basement, ground, and second) and contains over 100 laboratories and offices. The south wing is 22.6 by 40.5 meter (74 by 133 feet) on two floors and contains offices, a conference room, a machine shop, a lunch room, and rest rooms. The east wing (325A), housing the shielded process research hot cells, truck lock, and manipulator repair, is 14.6 by 39.6 meter (48 by 130 feet) with a 12.2 by 12.8 meter (40 by 42 feet) service area/truck lock addition, The west wing (325 B) is 16.2 by 16.5 meter (53 by 54 feet) and houses additional shielded process research hot cells.

The building frame is welded steel. The parapeted roof has a slightly sloped steel deck with gravel-finished roofing. Exterior walls are industrial-insulated panels of fluted steel.

### C.2.3.1 General Purpose Chemical Laboratories

These laboratories are located on the first floor and basement of the central portion of the 325 Building. The chemical, radiochemical and microstructural laboratories consist of approximately 70 rooms with a combined area of approximately 4,175 meters$^2$ (44,944 feet$^2$). Installed facilities include radiochemistry hoods, gloveboxes for transuranic materials, inert atmosphere gloveboxes, and laminar-flow clean hoods for analysis of sodium, lithium, and tritium.

Standard laboratories are multiples of 3.0- by 3.7-meter (10- by 12-feet) bays. Free-standing laboratory benches made of steel are arranged along the walls, with peninsulas in the large laboratories. The hoods have heavy stainless steel tray bottoms and steel bases. The hood sash moves over a bypass for a constant volume rate of exhaust flow. Besides the hoods, many stainless steel gloveboxes are provided. The gloveboxes have individual HEPA filters located at the exhaust and intake ports. Gloveboxes and hoods exhaust through testable, self-contained, primary HEPA filters before exhausting through the general ventilation exhaust system. The general exhaust system to the stack consists of banks of final testable HEPA filter located in the exhaust fan/filter addition.

### C.2.3.2 High-Level Radiochemistry Facility

The High-Level Radiochemistry Facility (325A) consists of four primary elements described below.

**C.2.3.2.1 Cell Area.** The 325A east wing contains three interconnecting cells (A-Cell, B-Cell, and C-Cell) and supporting facilities for work with megacuries of radionuclides. These cells are shielded with walls of 1.2-meter (4-feet) thick, high-density concrete on the front and sides and 0.9-meter (3-feet) thick, high-density concrete on the back. The front side contains manipulator ports, service ports, and high-density lead-glass windows having equivalent shielding to that of the walls. The cells are equipped with shielded doors, entry ports and through-the-wall remote Manipulators. Each cell is fully lined with stainless steel and equipped with floor drains that drain to critically safe sump tanks in a shielded basement vault.

In 1978, A-cell and C-Cell were cleaned out, renovated, and re-equipped to process 50 kg/d (110 lb/d) of light-water reactor fuel as part of the Nuclear Waste Vitrification Project (NWVP). The equipment includes dissolvers, feed preparation tanks, a battery of four 4.3-meters (14-feet) pulse columns, a continuous raffinate concentrator, ion-exchange columns for the recovery and purification of plutonium, and supporting tanks and instrumentation. The equipment extracted the fission product waste and transferred it to the 324 Building for conversion to borosilicate glass. The project was shut down in 1980, but no funds were provided for cleanup. Some of the unused equipment still remains. Space has been made in front of each window to conduct other research. Currently, that space is used for the tank sludge characterization program. B-Cell was not used during the NWVP program. It currently contains a core extruder and analytical measuring equipment used for the sludge characterization program.

**C.2.3.2.2 Catalyzed Electrochemical Plutonium Oxide Dissolution.** The catalyzed electrochemical plutonium oxide dissolution (CEPOD) process, which was developed for dissolving plutonium oxide and leaching plutonium contaminated scrap and waste, was installed in room 604 within the east wing. The process is performed in a stainless steel glovebox (2.4-meters high by 1.0-meters wide by 4.1-meters long) (7.9 by 3.3 by 13.4 feet) that has been covered with a 1.27-centimeters (0.5-inches) lead plate for radiation shielding. Two other gloveboxes are located in the north end of Room 604 and are interconnected with a pass-through. The larger of the two is 1.2-meters high by 1.0-meters wide by 1.8-meters long (3.9 by 3.3 by 3.3 feet). Two solution transfer lines, doubly encased of stainless steel, connect the two largest gloveboxes.

**C.2.3.2.3 Cask-Handling Area.** The support area (Room 603) immediately east of Room 604 is used for handling both solution and solid waste casks and moving manipulators between the cells and the repair/storage room.

The truck lock has doors on each end and serves as a ventilation buffer between the cask-handling area and the outside. The truck lock is of sufficient length that a tractor and cask trailer can be totally contained and isolated from the outside. The casks are on- and off-loaded by backing the trailer into the cask-handling area and using the bridge crane. The large solution casks are typically transferred between the cask trailer and the cask transfer station. The cask can be connected with the transfer lines leading to the hot cells, the gloveboxes, or to any of the vault tanks.

**C.2.3.2.4 325A Storage Area for Liquids.** The 325A high-radiation-level storage area for liquids consists of three underground vaults (A-,B-, and C-vaults). The cover blocks over the vaults are 0.9-meters (3-feet) normal concrete on A vault and 1.2-meters (4-feet) normal concrete on B and C vaults. A vault is 13.4 by 4.3 meters (44 by 14 feet), B vault is 7.9 by 4.3 meters (26 by 14 feet), and C vault is 4.3 by 4.3 meters (14 by 14 feet). A vault contains one 68,000 liter (18,000 gallon) stainless steel waste storage tank and one 1,514 liter (400 gallon) transfer tank. B vault contains two 14,800 liter (3,900 gallon) stainless steel tanks. C vault contains one 1,514 liter (400 gallon) and two 1,040 liter (274 gallon) stainless steel tanks. A vault has a stainless steel liner that is 0.9 meters (3 feet) high. B and C vaults have stainless steel liners that are 30.5 centimeters (1 foot) high.

### C.2.3.3 Shielded Analytical Laboratory

The Shielded Analytical Laboratory (325B) west wing contains six interconnecting hot cells. The cells are 1.7 by 1.7 meters (5.5 by 5.5 feet) compartments inside shielding walls. These compartments are divided into three groups of two compartments each, separated by hollow 10.2 centimeters (4 inches) thick sheet metal dividers. The shielding walls on the east and north sides of the cells are 30.5 centimeters (12 inches) of Meehanite iron. Shielding walls on the west and south sides are 66 centimeters (26 inches) of magnetite concrete. The east side of each compartment is equipped with two manipulators and with high-density, lead glass viewing windows. In a separate room (room 202) west of the six interconnecting hot cells are two all-metal cells. One cell is 2 meters (6.5 feet) long by 1.4 meters (4.5 feet) wide by 2.5 meters (8.33 feet) high, inside dimensions, with 15 centimeters (6 inches) thick walls and roof. The other cell (westerly) is 1.7 meters (5.5 feet) long by 1.5 meters (5 feet) wide by 1.5 meters (5 feet) high, inside dimensions, with 15 centimeters (6 inches) thick walls and roof. This cell sits on a pedestal that is 81 centimeters (32 inches) above the floor. Both cells have shielded viewing windows, two master-slave manipulators, an access door, and a pass-through port.

### C.2.3.4 Fissionable Material Storage Room

Room 530 on the first floor near the back of the 325 Building has been designated as a storage area for fissionable material. It contains a rack 1.7 meters (5.7 feet) high and 2.6 meters (8.5 feet wide), having 10 cubicles, each 0.6 meters$^2$ (2 feet$^2$), arranged in a diamond pattern. the rack is made of steel and bolted to the wall. The cubicles have lips and locked, hinged gates to prevent material from falling out.

## C.3 Identification and Screening of Hazards

The hazardous material stored and used at the 325 Building changes as programs are terminated and new programs started. Presently, there is radioactive material in hot cells, gloveboxes, and variety of other containers such as cabinets, waste drums, safes, and drawers. The material is in a variety of forms such as sealed sources, spent fuel segments, powder, liquid, contaminated wipes, etc. Table C.2 summarizes the location of fissionable material in the building on December 30, 1993. An Operational Safety Requirement for the building limits the maximum inventory of radionuclides to the risk equivalent of 170 Ci of plutonium-239. The risk equivalent is the quantity of plutonium-239 that would have the same dose consequences from a seismic event and uncontrolled fire as the given quantity of a radionuclide in a specified form and location. The seismic event/uncontrolled fire is a general emergency (9.7 rem at the site boundary). Therefore, the allowed inventory is sufficient to warrant an emergency plan for the building.

The 325 Building has over a thousand chemicals. Many of these are either common household products such as dish soap or laboratory quantities of common chemicals.

The exclusion of common materials is consistent with 40CFR Part 355.20(3) where the EPA definition of "Hazardous Chemicals" specifically excludes the following:

> "Any substance to the extent it is used for personal, family or household purposes or is present in the same form and concentration as a product packaged for distribution and use by the general public."

The exclusion of laboratory materials is consistent with 40CFR Part 355.20(3), where the EPA definition of "Hazardous chemicals" specifically excludes the following:

> "Any substance to the extent it is used in a research laboratory or a hospital or other medical facility under the direct supervision of a technically qualified individual."

This exclusion applies generally to the 325 Building since there are no large scale demonstration projects that involve potentially hazardous chemicals at this time. All the current research projects that involve chemicals are small scale laboratory operations that are under the direction of a technically qualified researcher. Table C.3 shows the small quantities of individual chemicals that are used in the

**Table C.2.** Fissionable Material Location

| Room | Location | Isotopes |
|---|---|---|
| 55A | Entire room | $^{235}U$(30.7 g), $^{237}Np$(11.6 g), Pu(91.3 g) |
| 305/307 | Gloveboxes, hoods, cabinet | Pu(63.8 g) |
| 406 | Gloveboxes, hoods | $^{235}U$(0.5 g) |
| 504 | Glovebox, hood, waste drum | $^{233}U$(2.3 g), $^{237}Np$(20.6 g), $^{238}Pu$(15.0 g), Pu(125.6 g), $^{241}Am$(0.5 g), $^{243}Am$(8.4 g) |
| 201 | Cells 1,2,3,4,5,6 | $^{233}U$(5.1 g), $^{235}U$(75 g), $^{237}Np$(3.2 g), Pu (116.4 g) |
| 202 | Entire room and shielded cubicles | $^{237}Np$ (48.6 g) |
| 506 | Gloveboxes, hoods | Pu(224.1 g) |
| 530 | Storage array | $^{235}U$(160.2 g), Pu(107.4 g) |
| 528 | Drum storage, cabinet | $^{233}U$(12.4 g), $^{235}U$(49.6g), $^{237}Np$(16.7 g), $^{238}Pu$(0.7 g), Pu(315.4 g), $^{241}Am$(0.6 g) |
| 44 | Drum storage | $^{233}U$(0.1 g), $^{235}U$(1.8 g), $^{237}Np$(2.3 g), $^{238}Pu$(0.3 g), Pu(98.0 g), $^{241}Am$(1.3 g), $^{243}Am$(0.5 g), $^{244}Cm$(2.9 g) |
| 46 | Storage cage | $^{238}Pu$(8.8 g), Pu(0.1 g), $^{241}Am$(0.9 g) |
| 48 | Safe | $^{237}Np$(14.9 g), $^{238}Pu$(0.3 g), Pu(3.3 g), $^{241}Am$(2.5 g) |
| 317 | Hoods, cabinet | $^{233}U$(0.2 g), $^{235}U$(2.4 g), $^{237}Np$(0.3 g), Pu(0.7 g) |
| 411 | Cabinet and drawer | $^{233}U$(1.0 g), $^{235}U$(5.8 g), $^{237}Np$(8.7 g), Pu(5.7 g), $^{241}Am$(0.5 g) |
| 516 | Gloveboxes, hoods, special center island | $^{235}U$(115.3 g), $^{237}Np$(1.1 g), Pu(6.6 g) |
| 601 | Cells A,B | $^{235}U$(88.7 g), $^{237}Np$(32.6 g), Pu(75.6 g), $^{241}Am$(24.5 g), $^{243}Am$(7.2 g), $^{244}Cm$(4.6 g) |
| 604 | Gloveboxes, drum storage | Pu(860.7 g), $^{241}Am$(0.1 g) |
| 414 | Cabinet in NW corner | $^{233}U$(0.1 g), $^{235}U$(7.1 g), $^{237}Np$(0.1 g), Pu(0.7 g) |
| 56 | Hood, cabinet drawers | $^{235}U$(148.3 g), $^{237}Np$(1.2 g), $^{241}Am$(0.1 g) |

building. This list was taken from a January 24, 1994, inventory and shows the amount of each chemical that was classed as "Extremely Hazardous" per 40 CFR Part 355. The quantity of each chemical is less than threshold planning quantity (TPQ) specified in the regulation. Two chemical spill scenarios are included in Section C.5 to further demonstrate that chemical spills are not expected to be a problem outside the building.

Table C.3. 325 Building Extremely Hazardous Chemicals

| Material | Quantity (lb) | Threshold[a] (lb) |
|---|---|---|
| Ammonia | 19.8 | 500 |
| Bromine | 5.3 | 500 |
| Carbon Disulfide | 5.3 | 10,000 |
| Chloroform | 37.4 | 10,000 |
| Formaldehyde | 6.3 | 500 |
| Hydrofluoric acid | 31.9 | 100 |
| Hydrogen Peroxide | 74.2 | 1000 |
| Mercuric Oxide | 11.1 | 500/10,000 |
| Nitric Acid | 437.8 | 1,000 |
| Nitric Oxide | 13.7 | 100 |
| Phenol | 7.3 | 500/10,000 |
| Sulfuric Acid | 195.1 | 1,000 |
| Titanium Tetrachloride | 9.0 | 100 |
| Vanadium(V) Oxide | 5.5 | 100/10,000 |

(a) TPQ is from 40 CFR pt 355 Appendix A. Extremely hazardous solid substances are subject to either of two TPQs. The lower quantity applies to powder with particle size less than 100 microns or liquid solutions or molten material.

## C.4 Hazard Characterization

The historical at-risk radionuclide inventory in the 325 Building has been larger than those that are currently permitted by the established Operational Safety Requirements. Furthermore, the inventory changes as programs are terminated and new programs started. Therefore, the size and makeup of the inventory cannot be historically defined. The approach that was taken in PNL-7748 was to begin by describing a reference inventory that represents an upper-range historical inventory. After that, reduction factors were applied to the historical inventory to obtain the inventory used in the accident scenario calculations. The several at-risk inventories in the 325 Building include that in the main laboratories, that stored in the basement, that in the CEPOD process area, that in the 325A liquid waste tanks, that in the hot cells, and that held up within the building.

### C.4.1 Main Laboratories

Historically, most of this inventory has been at risk in gloveboxes, drawers, cabinets, hoods, and benches. A relatively small amount of material has been kept in pipe nipples, transport casks, sealed sources, closed safes, and other containers that could withstand crushing and jarring during an earthquake.

To estimate the relative amounts of plutonium and other fissionable materials that were in different physical forms, the PNL safety analysis group surveyed some of the laboratories. The laboratories surveyed were Rooms 302, 305, 306, 307, 308, 317, 406, 410, 411, and 414. The distribution of uranium and plutonium at the time of the survey (1990) is shown in Table C.4.

**Table C.4.** Distribution of Uranium and Plutonium in Main Laboratories

| | Fractions | | |
|---|---|---|---|
| | **Total U** | $^{235}$U | **Pu** |
| Not at risk | 0.04 | 0.02 | 0.01 |
| Glovebox | | | |
| Powder | 0.08 | 0.30 | 0.14 |
| Fused or pellets | 0.02 | 0.07 | 0.04 |
| Solution | 0.01 | 0.01 | 0.39 |
| Hood/bench | | | |
| Powder | 0.36 | 0.23 | |
| Pellets | 0.08 | 0.04 | |
| Solution | 0.02 | 0.02 | 0.01 |
| Drawer/cabinet | | | |
| Powder | 0.31 | 0.23 | 0.24 |
| Pellets | 0.08 | 0.08 | 0.07 |
| Solution | | | 0.01 |

#### C.4.1.1 Inventory

The inventory changes as programs are completed and new programs started. Table C.5 compares the present inventory of fissionable material with the January 30, 1990 inventory.

These inventories, which were derived from accountable materials inventories, are not a complete description of the plutonium isotopic breakdown. Therefore, to approximate the building plutonium inventory, the isotopic breakdown for the Fast Flux Test facility mix was used (Table C.6.). PNL-7748 concluded that this mix was representative of the plutonium in the building in 1990.

The source term for the earthquake was derived by applying the distribution in Table C.4 and the isotopic mix in Table C.6 to the entire 2000 grams of plutonium permitted in the main building.

**Table C.5.** Total 325 Building Fissionable Material Inventory

| Nuclide/Material | Jan. 30, 1990 | Dec. 27, 1993 |
|---|---|---|
| $^{238}U$ | 168.4 kg | 40.1 kg |
| $^{233}U$ | 22.2 g | 26.3 g |
| $^{235}U$ | 1.33 kg | 0.63 kg |
| $^{237}Np$ | 150.7 g | 164.8 g |
| Total Pu (All Isotopes) | 3276 g | 1957.6 g |
| $^{238}Pu$ | 14.9 g | 25.4 g |
| $^{241}Am$ | 33.7 g | 31.1 g |
| $^{242}Pu$ | 0.7 g | 1.1 g |
| $^{243}Am$ | 16.1 g | 16.1 g |
| $^{244}Cm$ | 5.8 g | 7.5 g |

**Table C.6.** Pu Isotopic Mix

| Isotope | Weight Fraction |
|---|---|
| Pu-238 | 0.00048 |
| Pu-239 | 0.86613 |
| Pu-240 | 0.1196 |
| Pu-241 | 0.0122 |
| Am-241 | 0.00136 |
| Pu-242 | 0.00180 |

### C.4.1.2 Properties of Plutonium

Since its discovery in the winter of 1940-1941, plutonium has been extensively studied and is one of the most characterized chemical elements. Many references are available on the nuclear and chemical properties. The following brief summary was taken from the DOE Health Physics Manual of Good Practices for Plutonium Facilities(DOE 1988).

Plutonium is a silvery-white metal, much like nickel in appearance. In moist air or moist argon, the metal rapidly oxidizes producing a mixture of oxides and hydrides. If exposed long enough, an olive-green powdery surface coating of $PuO_2$ is formed. With this coating the metal is pyrophoric.

Plutonium metal has a low melting point (640° C) and an unusually high boiling point (3327° C). At room temperature, plutonium exists in the alpha phase with a density of about 19.86 g/cm$^3$. Heating that is caused by high specific activity or machining operations can cause large changes in volume.

At room temperature, the most stable oxide is $PuO_2$. Loose $PuO_2$ powder usually has a density of about 2 grams/centimeters$^3$. If the oxide is pressed and sintered into pellets, it may have a density of 10.3 to 11.0 grams/centimeters$^3$.

The chemistry of plutonium is complex and many different chemical species often coexist. Plutonium is the fifth element in the actinide series, which consists of elements with properties that stem from partial vacancies in the 5f electron shell. In general, there are four oxidation states: (III), (IV), (V), and (VI). The complicated chemistry of plutonium is discussed in detail in Section III of Volume I of the Plutonium Handbook: A Guide to the Technology (Wick 1967) and in Plutonium (Tauble 1964).

The problems of oxidation of metallic plutonium during storage were recognized shortly after the discovery of plutonium. Massive (i.e., not finely divided) plutonium is relatively inert in dry air and is comparatively easy to handle and store for a few days. Special precautions must be taken when storing metallic plutonium for longer periods of time.

The health physics aspects of an accidental plutonium fire can be serious. A fire can burn through containment structures, resulting in the dispersal of $PuO_2$ over a wide area and the potential for inhalation exposure during the fire or during subsequent decontamination efforts. Plutonium, some plutonium alloys, and some plutonium compounds are pyrophoric. Finely divided plutonium, such as turnings or powder, are definitely pyrophoric and must be handled with care. Certain solvents and organic compounds form flammable mixtures with plutonium. Chlorinated solvents have been involved in several fires with plutonium and its alloys.

Pyrophoric products may be formed on plutonium and certain alloys if they are stored for long times in closed containers. When a container is opened, spontaneous ignition may occur, which can result in the destruction of the container, damage to the glovebox, and spread of finely divided or particulate oxides throughout the glovebox and its ventilation system.

The primary emergency preparedness concern with plutonium is entry into the body from inhalation. The distribution pattern of inhaled material within the lung is related to the activity median aerodynamic diameter (AMAD) of the aerosol provided that the particle sizes of the particulates follow a log-normal distribution (International Commission on Radiological Protection (ICRP) 1979). The ICRP (1979) has published a mathematical model for estimating the distribution of an aerosol in the respiratory system based on the AMAD. The AMAD for a particular aerosol may be estimated (e.g., Knutson and Lioy 1983), although it is common to assume an AMAD of 1 µm.

The length of time that an aerosol will be expected to remain in the lung following inhalation is based on its solubility class. There are three solubility classes described by the ICRP in their Publication 30 (ICRP 1979): D (day), W (week) and Y (year); the times listed indicate the order of magnitude of the half-life of the material in the lung. The biological half-lives for D, W, and Y materials in the lung are 0.5, 50, and 500 days respectively. The actual solubility class can be estimated by measurement of the materials solubility in simulated lung material or by using the solubility class determined by the ICRP for various chemical compounds (see Table C.7).

**Table C.7.** Solubility Classes of Plutonium Compounds

| Compound | Solubility Class |
|---|---|
| None | D |
| All except oxide | W |
| Oxide | Y |

## C.4.2 Basement Storage

Westinghouse Hanford Company (WHC) stored uranium and thorium in the basement of the 325 Building for several years. This material has been removed.

## C.4.3 CEPOD Process Area

The CEPOD process was designed to make up to 14 runs per year. At the end of each run is a period during which the entire plutonium oxide output of the run was contained in the process gloveboxes as powder and was at risk. Thus, the worst-case historical inventory was the 2000 grams of plutonium permitted to the process by PNNL's safeguards group, and the worst-case form was plutonium oxide powder.

### C.4.3.1 Inventory

The CEPOD process in not active but approximately 859 grams of plutonium remain in the gloveboxes and drum storage. This includes 48.3 grams of Material Unaccounted For (MUF) in glovebox 36 which is assumed to be holdup.

### C.4.3.2 Properties

The material is in several forms including ash, paste and oxide. The properties of plutonium are briefly described above.

### C.4.3.3 Conditions of Storage and Use

Most of the inventory, 606.8 grams, is in three type 6M drums. The remainder is in gloveboxes #36 and #38. All of the glovebox inventory is in process vessels, cans and holdup. The CEPOD process in room 604 is not active at this time.

### C.4.4 Liquid Waste Tanks

The exact inventory of radionuclides in the liquids stored in the 325A tanks varies from project to project. However, concentrations are generally quite low. Each of the three vaults in the 325A high-level liquid storage area has a criticality-based limit of 230 g plutonium, or a total of 690 g plutonium for the seven storage tanks(total volume of which is 102,700 L).

### C.4.5 Hot Cells

The maximum historical inventory for the 325A hot cells resulted from handling large quantities of spent fuel. Under those circumstances, the most significant radionuclides present, from a dose standpoint, would be 265 Ci of krypton-85 and 1.7 Ci of tritium. No operations of this magnitude are currently under way or approved. The historical inventory is the bounding inventory because of its size and its immediate releasability.

### C.4.6 Holdup

There are few measurements of plutonium holdup as surface contamination, or non-testable filter contents. One set of measurements in 1989 showed that of five glovebox holdup measurements, the maximum value was 14.5 g plutonium. Another glovebox holdup measurement in 1990 showed holdup of 0.83 g plutonium. This included smearable, nonsmearable, and filter contamination. PNL-7748 estimated that the total building holdup including gloveboxes, ducts, and primary and secondary filters is 380 g of plutonium with the FFTF plutonium isotopic mix.

## C.5 Event Scenarios

PNL-7748 identified various scenarios that could breach the barriers that maintain control over each of the hazardous materials discussed in the previous section. The paragraphs below determine the emergency category of various scenarios using the consequences reported in PNL-7748 and the criteria listed in Tables C.8 and C.9.

**Table C.8.** Radiological Release Criteria

| Emergency Category | Criteria[a] |
|---|---|
| Alert | > 100 mrem committed dose equivalent at facility boundary |
| Site Area | ≥ 1 rem committed dose equivalent at facility boundary |
| General | > 1 rem committed dose equivalent at site boundary |
| (a) The criteria apply to a peak concentration of the substance in air. If ERPG values have not been established for a substance, alternative criteria specified in the Emergency Management Guide for Hazards Assessments shall be used. | |

**Table C.9.** Non-Radiological Release Criteria

| Emergency Category | Criteria[a] |
|---|---|
| Alert | > ERPG 1 at facility boundary |
| Site Area | ≥ ERPG 2 at facility boundary |
| General | ≥ ERPG 2 at site boundary |
| (a) The criteria apply to a peak concentration of the substance in air. If ERPG values have not been established for a substance, alternative criteria specified in the Emergency Management Guide for Hazards Assessments shall be used. | |

There are general criteria for emergency classification in addition to the numerical values in the tables above. The threshold between reportable occurrences and the Alert classification is difficult to establish based solely on a numerical value. The following general criteria apply in addition to the airborne release concentration values specified in Tables C.8 and C.9 above.

- **Alert** – An Alert Level Emergency shall be declared when events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility with an increased potential for a release.

  In general, the Alert classification is appropriate when the severity and/or complexity of an event may exceed the capabilities of the normal operating organization to adequately manage the event and its consequences.

- **Site Area** – A Site Area Emergency shall be declared when events are in progress or have occurred which involve actual or likely major failures of facility functions needed for protection of workers and the public.

- **General** – A General Emergency shall be declared when events are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with a potential for loss of confinement or containment integrity.

There is additional emergency classification guidance in the Emergency Management Guide on Event Classification and Emergency Action Levels (EALs). The Hazards Assessment in the following sections is based primarily on a comparison of calculated consequences with the numerical criteria in the tables above. However, some recommendations are provided based on the more General Emergency classification criteria.

### C.5.1 Facility Emergency Events

All significant quantities of radioactive materials are handled inside gloveboxes and Hot Cells. The paragraphs below briefly describe possible containment barrier failure modes.

### C.5.1.1 Gloveboxes

**C.5.1.1.1 Failure of Primary Barrier.** The primary barrier for gloveboxes are the walls, gloves, ports and ventilation openings. A loss of glovebox confinement could be caused by one of the following:

1. **Torn or ripped off glove** – While the potential for this type of accident is relatively high, the consequences are low. Gloveboxes operate at a pressure that is negative compared to the room. A glove breach will cause little spread of contamination as air will be drawn into the box.

2. **Glovebox overpressurization** – Compressed air is supplied to those gloveboxes requiring dry air atmospheres. These gloveboxes have been equipped with individual over-pressurization control systems. The consequences of an overpressurization could be a breach of the box integrity and release of a portion of the glovebox contents to the adjacent laboratory.

3. **Fires** – Glovebox fires can result in loss of confinement in the glovebox and local contamination of the adjacent laboratory. Administrative controls provide some control of solvents and flammable materials. The exhaust system will work to maintain the glovebox at a negative pressure, which would reduce the spread of contamination. Gloveboxes that take air from the room could, if overpressurized by an energy release such as a fire, expel radioactive material into the room through the air intake. Intake HEPA filters are provided against this eventuality. However, the filters are not testable in place.

4. **Explosions in gloveboxes** – These have occurred in various facilities. In this type of event, contamination could spread to the corridor and adjacent laboratories before the exhaust system could control the event.

### C.5.1.2 Hot Cells

**C.5.1.2.1 Failure of Primary Barrier.** The primary barrier for hot cells are the walls, windows, manipulator boots, ports and ventilation openings. The loss of hot cell confinement could be caused by one of the following:

1. **Leaking manipulator boot or unsecured port** – The consequences for this type of accident depend upon the size of the leak relative to ventilation air flow. The confinement system is based on maintaining a negative air pressure in the cell relative to the adjacent laboratory. Alarms are provided to warn of a loss of cell pressure differential. Even during an air pressure differential loss, it would be unlikely that a spread of contamination of any significance would occur in the

absence of air currents within the cells to expel contamination. The primary concern for an unsecured port or missing plug is radiation streaming.

2. **Loss of Hot Cell Ventilation** – An electrical power failure, failure of ventilation fans, or faulty ventilation damper alignment could cause a loss of air pressure differential. Various alarms are provided to warn of these conditions. All operations in the cells would be curtailed and sources of contamination secured until the ventilation system is returned to normal.

3. **Fires** – Hot cell fires have occurred in several facilities and can result in loss of confinement by disrupting the ventilation system and providing air currents to move the material. Exhaust filters can be plugged with smoke causing either reverse air currents out the inlet openings or failure of the filter because of high differential pressure. In extreme cases, flame or burning embers can ignite an exhaust filter. The chance of loss of both stages of HEPA filtration is very small because of the physical separation.

4. **Explosions in Hot Cells** – These have occurred in various facilities. If the explosion breaches containment, contamination could spread to the corridor and adjacent laboratories before the exhaust system could control the event.

5. **Loss of HEPA filtration** – The ventilation and filter systems provide the principal engineered features for contamination control within the building. HEPA filter damage could result from maintenance, construction, overloading, age or manufacturing defect. The probability of undetected failure of the HEPA filters is reduced by annual and post-installation inspection and testing. The loss of the primary testable HEPA filter on the hot cells, gloveboxes, and fume hoods is unlikely in the event of explosions, fires and other events because protection is provided by the non-testable HEPA filter at the point of origin and by several right angels in the exhaust duct upstream of the primary HEPA filter.

- **Effects of Other Barriers** – The building structure and ventilation system provide a secondary barrier to a release from a glovebox, hot cell or fume hood. The building is not designed as a containment structure. Therefore, some leakage is possible around or through doors, windows and building penetrations. However, the building ventilation system is designed and operated to assure safe confinement of radioactive materials under normal and likely failure modes. Cascading pressure levels are used to maintain proper air flow balance and direction. The main exhaust air system for the building consists of four exhaust fans, primary and final testable stages of HEPA filters, an exhaust plenum, connecting ductwork, and a 16.8 m (55 ft) high stack. An intact and operating exhaust system would reduce a particulate release by a factor of at least 105.

- **Range of Possible Releases** – Common problems such as torn gloves in a glovebox are not an emergency preparedness concern since potential releases from the building are far below the level that would create an Alert emergency. Several major failures of material confinement are analyzed below. They include the bounding glovebox and hot cell fires, glovebox and hot cell explosions and loss of electrical power. These events cover a range of possible releases from non-emergencies to a Site Area emergency. Events such as large fires that involve more than one room have the potential to reach a General emergency as described below.

### C.5.1.3 Facility Fire

PNL-7748 analyzed four fire scenarios. They range in severity from a glovebox fire to a post-seismic uncontrolled building fire. These scenarios and their consequences are reviewed below to provide insight on establishing the emergency classification of 325 Building fires.

#### C.5.1.3.1 Hot Cell Fire

This scenario is the bounding Hot Cell fire. In this scenario, waste materials from the Nuclear Waste Vitrification Program (NWVP) inside the "A" hot cell, including rags soaked with organic solvent, are ignited by spontaneous heating. The scenario further assumes that the initial fire causes failure of the connections on a solvent extraction scrub column. The organic solvent is ejected, causing failure of the floor-level exhaust column. Flame propagation along the exhaust duct surfaces causes loss of both the primary and secondary HEPA filters, together with any charcoal filter that may be in place. The final filter bank is assumed to remain intact. This scenario is from a program that is no longer active in the cell. However, it represents the bounding case since current and projected inventories of combustibles and radionuclides are believed to pose lower consequences.

The hot cell inventory was selected as a bounding case, although the Nuclear Waste Vitrification Program (NWVP) under which the inventory was provided is no longer in existence. The bounding nature of the inventory arises from its being dissolved in combustible solvent and its high quantity of highly radiotoxic Pu radionuclides. Current and projected inventories of combustibles and radionuclides are believed to pose lower consequences.

There were 25 liters of solvent present in the three columns and two organic headpots for the NWVP. It is assumed that all of the solvent was ejected when the heat and flames from the spontaneous trash fire caused column connections to fail. Of the solvent release, 10% (or 2.5 liters) was assumed to cover various surfaces in the cell and to be burned in the fire with the remainder going into the drain. A release fraction of 11.4% (Ayer et al. 1988) was used for the uranium and plutonium dissolved in a combustible liquid. The iodine has a release fraction of 84.3%. The respirable fraction is 66% (Mishima 1973). The floor level in cell filters are assumed to be splashed by the burning liquid and rendered nonfunctional. Incomplete combustion is assumed to permit flame propagation to the primary HEPA filters causing loss of both of these filter banks. Because the final filters are located in a separate building, the final filters are assumed to survive. A release fraction of 0.001 (99.9% efficiency) is attributed to these filters. The charcoal filters are not currently in place, but would be if work involving iodine radioisotopes were under way. It is assumed that the charcoal filters are exposed to combustion and they fail. Table C.10 summarizes the source term for this event.

**Table C.10.** Hot Cell Fire Source Term

| Nuclide | Solvent Conc. (Ci/L) | Solvent Released (L) | Release Fraction | Respirable Fraction | Filter Factor | Source (Ci) |
|---|---|---|---|---|---|---|
| $^{129}I$ | 1.5E-07 | 2.5 | 0.843 | 1 | 1 | 3.16E-07 |
| $^{234}U$ | 6.0E-05 | 2.5 | 0.114 | 0.66 | 0.001 | 1.13E-08 |
| $^{235}U$ | 1.3E-06 | 2.5 | 0.114 | 0.66 | 0.001 | 2.45E-10 |
| $^{236}U$ | 2.3E-05 | 2.5 | 0.114 | 0.66 | 0.001 | 4.33E-09 |
| $^{237}U$ | 1.9E-04 | 2.5 | 0.114 | 0.66 | 0.001 | 3.57E-08 |
| $^{238}U$ | 2.5E-05 | 2.5 | 0.114 | 0.66 | 0.001 | 4.70E-09 |
| $^{238}Pu$ | 2.2E-01 | 2.5 | 0.114 | 0.66 | 0.001 | 4.14E-05 |
| $^{239}Pu$ | 2.5E-02 | 2.5 | 0.114 | 0.66 | 0.001 | 4.70E-06 |
| $^{240}Pu$ | 3.7E-02 | 2.5 | 0.114 | 0.66 | 0.001 | 6.96E-06 |
| $^{241}Pu$ | 7.8E+00 | 2.5 | 0.114 | 0.66 | 0.001 | 1.47E-03 |
| $^{242}Pu$ | 1.1E-04 | 2.5 | 0.114 | 0.66 | 0.001 | 2.07E-08 |

All plutonium is assumed to be converted to oxide by the fire: hence lung clearance class Y is used in the dose calculation. The release was modeled as a ground level release with a 600 $m^2$ building wake factor. The calculated dose given in PNL-7748 is 15 mrem at the facility boundary and 1.5 mrem at the site boundary. These doses are well below the criteria for an "Alert" emergency.

This scenario models a hot cell fire and shows that significant consequences are not expected outside the facility if the release is filtered through at least one bank of HEPA filters.

The scenario, however, demonstrates the difficulty of classifying events solely on the basis of the calculated consequences. Other more general criteria also apply. The scenario assumes that two of the three HEPA filter banks breach leaving only one bank intact to prevent a release. The final bank would be challenged by the smoke from the fire. Based on the barrier approach outlined in the Emergency

Management Guide for Event Classification and EALs, this scenario would be classified at the highest emergency class possible for the available inventory and release mode since two of the barriers have failed and the third is challenged. The highest emergency class possible is a General Emergency since the site boundary dose from the release would be approximately a factor of 1000 higher, or 1.5 rem, if the final HEPA filter failed.

Hot Cell fires in the 325 Building are expected to range from non-emergencies to General emergencies depending upon the severity of the fire, inventory at risk in the hot cell and the condition of the cell ventilation system.

#### C.5.1.3.2 Consuming Glovebox Fire

The bounding glovebox fire scenario is a fire in a glovebox containing plutonium oxide powder. A solvent vapor in the glovebox is postulated to ignite causing an explosion and fire. The fire continues until the gloves and the combustible glovebox windows are consumed. The fire is then rapidly controlled. A portion of the plutonium oxide powder becomes airborne through the explosion and through burning as contamination of combustible liquids and solids. Additional plutonium is carried away by the water used to fight the fire. A small fraction of this plutonium reaches the pavement and soil outside the building through doors left open to accommodate fire hoses. A fraction of the plutonium carried outside by the water is resuspended by the wind.

The source term was based on as assumed inventory of 230 g of $PuO_2$ in a can inside the glovebox and 14.5 g of $PuO_2$ holdup in the glovebox. The overall combined release/respirable fraction is about 0.00016 to the air outside the building. Section B.4 in PNL-7748 provides the details of release fraction calculations. The material is assumed to be powder for FFTF fuel. The activity release is shown in Table C.11.

**Table C.11.** Source Term for Consuming Glovebox Fire

| Nuclide | Ci |
|---|---|
| $^{238}Pu$ | 0.00032 |
| $^{239}Pu$ | 0.00202 |
| $^{240}Pu$ | 0.0010 |
| $^{241}Pu$ | 0.05110 |
| $^{241}Am$ | 0.00017 |
| $^{242}Pu$ | 2.7E-07 |

This scenario represents a worst case combination of circumstances that bound a single glovebox fire. The release was modeled as a ground level release with a 600 m2 building wake calculation. The calculated dose of 630 mrem at the facility boundary places this scenario in the Alert category. Smaller fires that do not challenge the glovebox and ventilation integrity would not be emergency events.

#### C.5.1.3.3 Fire During Sprinkler Outage

Two possible situations could lead to a fire that spreads from one room to another. The first is a fire during maintenance on the sprinkler system. The second is a fire following a seismic event that disrupts both the sprinkler and building ventilation systems. The combined ventilation/sprinkler outage has more severe consequences.

In this scenario, two adjacent rooms are involved in a fire following disruption of the sprinkler and building ventilation systems. A glovebox containing 230 g of dispersible plutonium is substantially destroyed in each room by the fire. Each glovebox is equivalent in radiological and combustible inventory to the one postulated in the consuming glovebox fire. Because of the loss of ventilation postulated in this event, the building release fraction is 0.25 compared to about 0.02 for the consuming glovebox fire. The nuclides released to the air outside the building (source term) are shown in Table C.12. The calculated dose from the fire is 14.8 rem at the facility boundary and 2 rem at the site boundary. These results place this scenario in the General Emergency category.

**Table C.12.** Source Term for Sprinkler Outage Fire

| Nuclide | Ci |
|---|---|
| Pu-238 | 0.00772 |
| Pu-239 | 0.0488 |
| Pu-240 | 0.0248 |
| Pu-241 | 1.234 |
| Am-241 | 0.00406 |
| Pu-242 | 6.4E-06 |

#### C.5.1.3.4 Post-Seismic Uncontrolled Fire

The post-seismic fire is the bounding analyzed event in PNL-7748. The scenario is initiated by an earthquake with a peak horizontal acceleration of 0.135 grams, which has an annual frequency of 1 in 5000 years. The basic building structure survives the event but the ventilation and sprinkler systems are damaged. Release paths are created by broken windows and doors jammed in a partially open position. A fire starts that the Hanford Fire Department is unable to control because of confusion caused by the earthquake, damage to fire fighting equipment, hazards to fire fighters or assignment to higher priority fires. Early in the fire, a deflagration that breaches the building wall or roof is assumed to occur. The explosive material is a room-sized cloud of flammable gas or vapor. The cloud is assumed to accumulate in a room because of the failure of the HVAC system. The explosion not only breaches the building but damages and spreads hot gases over much of the inside of the building, leading to the spread of the fire throughout the building.

All of the material in the main laboratories, whether in gloveboxes, drawers, cabinets, hoods, or benches, is assumed to be at risk from fire and/or heating, except for the small amount kept in pipe nipples, closed safes, and other containers that could withstand both the earthquake and the fire. Only one-third of the material is considered to be subject to the blast effects of the explosion.

The inventory from the CEPOD process is not considered to be at risk from explosion, since it is separated by a wall from the main building where solvents and flammable gases are used and since such flammables are not used in the area. There is a release, however, due to the fire and the earthquake.

It is conservatively assumed that the contents of all the tanks in the 325 Building vault spill into the vault. The inventory is not considered to be at risk from fire or explosion because of the lack of combustibles. The limit on the amount of material release is the amount of waste solution fog that can be suspended in the volume of stagnant air in the vault.

Both the 325A and 325B hot cells would remain undamaged by the postulated seismic event. However, the exhaust ducting may be sheared off in the basement and the primary filters damaged. The hot cell atmosphere is assumed to leak through the sheared ducts and be partially released through openings in the building walls. The hot cells are not considered to be at risk from the fire.

The holdup in the 325 Building is in the form of dust and plated-out material in the gloveboxes, plated-out material in the exhaust ducts, and the contents of the non-testable glovebox and cell filters and the downstream testable filters. This scenario assumes 14.5 g of plutonium in each of 26 gloveboxes. The plutonium is assumed to be divided between the inside of the glovebox walls (10.5 grams) and the glovebox non-testable filter (4 grams). If the glovebox walls are combustible, the holdup on the walls is assumed to burn. If not, the holdup is subject only to resuspension.

The activity released during the first two hours following a seismic event and uncontrolled fire is shown in Table C.13.

**Table C.13.** Source Term for Post-Seismic Uncontrolled Fire

| Nuclide | Ci |
|---|---|
| $^{3}H$ | 0.0425 |
| $^{85}Kr$ | 66.2 |
| $^{232}Th$ | 9.95E-7 |
| $^{238}U$ | 2.73E-5 |
| $^{235}U$ | 1.20E-6 |
| $^{233}U$ | 6.63E-5 |
| $^{237}Np$ | 3.35E-5 |
| $^{238}Pu$ | 0.112519 |
| $^{239}Pu$ | 0.190783 |
| $^{240}Pu$ | 0.096653 |
| $^{241}Pu$ | 4.82295 |
| $^{241}Am$ | 0.050242 |
| $^{242}Pu$ | 2.61-05 |
| $^{243}Am$ | 0.001015 |
| $^{244}Cm$ | 0.152243 |

The calculated dose is 94 rem at the facility boundary and 9.7 rem at the site boundary. This event would be a General Emergency.

The 325 Building contains a large number of chemicals in small quantities. The main danger in a large fire is potentially high concentrations in local areas within the building. The building would be evacuated in these circumstances limiting the exposure to individuals. No significant impact from chemical exposure is expected outside the building.

#### C.5.1.3.5 Conclusion for 325 Building Fires

The Guidance Document for Hazards Assessments specifies that a broad range of events should be considered. The scenarios described above demonstrate the wide range of possible consequences from 325 Building fires. Small fires such as smoldering rags in a hot cell would not require activation of the emergency response centers. The building operations organization and the Hanford Fire Department would likely extinguish the fire with no release of hazardous materials outside the building. Conversely, a building-wide uncontrolled fire would be a General Emergency since there is a substantial amount of hazardous material in the building and the building is located near the Hanford Site boundary. The paragraphs below describe the expected range of severity for glovebox, hot cell, and building fires.

Fires in a single Glovebox are expected to range from non-emergencies to Alert emergencies depending upon the severity of the fire, material in the box and the potential for an unfiltered release path. Fires that involve more than one glovebox could release enough material to cause a General Emergency.

Fires in a single hot cell are expected to range from non-emergencies to General emergencies. The key determining factors are the inventory in the cell, severity of the fire and the condition of the cell ventilation/cell containment systems.

The emergency classification of building fires range from non-emergencies to General emergencies. For example, a waste basket fire in an office area would not be an "emergency" condition. Conversely, large fires that involve hazardous materials can create a General Emergency condition. The main factors that determine the emergency classification are the fire severity and duration, proximity of the fire to hazardous materials and, damage to confinement and containment barriers.

### C.5.1.4 Facility Explosion

Two glovebox explosion scenarios and one building breach explosion scenario are described below. The glovebox scenarios are similar in that they postulate that an explosion breaches a glovebox but the plutonium made airborne from the events passes through two stages of HEPA filters before release from the building. The two scenarios differ in the magnitude of the source term and the postulated cause of the explosion. Both glovebox explosion scenarios are reviewed in Section C.5.1.4.1 below. The building breach event is postulated to occur from the buildup of an explosive vapor or gas mixture inside a room containing 230 grams of plutonium. This scenario has worse consequences than the glovebox explosions since the building is breached. The building breach explosion is described in Section C.5.1.4.2 below.

**C.5.1.4.1 Glovebox Explosions.** The first glovebox explosion scenario is an explosion in an ion-exchange column inside a glovebox. Ion-exchange columns are used in the 325 Building to separate plutonium from other impurities in solutions. Resins used in the past in these types of columns have been involved in explosions under conditions in which the resins were exposed to high nitric acid concentrations, elevated temperatures, and drying or oxidation of the resin. As a result of the explosion, the column is assumed to break with enough energy to breach the glovebox window. Hot liquid and resin spray into the room and throughout the interior of the glovebox.

The plutonium nitrate solution contains 100 grams/liter. For an energy level similar to that expected in this scenario, an aerosol concentration of 1.6 milliliter/meter$^3$ was achieved in flashing spray experiments. The glovebox is about 10 meters$^3$ in volume. Thus 16 milliliters of solution are assumed to be suspended in the glovebox from the accident with 62% in the respirable size range. Approximately 26% of this amount escapes to the room via the broken glovebox window. In addition, 0.25 grams of solution are resuspended from the remaining solution spilled onto the floor of the glovebox over the 2 hours following the explosion. The plutonium made airborne from the event passes through two stages of HEPA filter assumed to be 99.9% and 99.8% efficient. The release from the building is 2.4E-06 grams of Pu. The calculated facility boundary dose is $4 \times 10^{-5}$ rem.

The second glovebox explosion scenario involves the CEPOD process. Hydrogen generation is postulated to occur by the electrolysis of water at the cathode. The 15-centimeters by 1.2-meters glass reaction vessel in the off gas scrubber system fills with a mixture of hydrogen and air and the mixture is ignited. The explosion shatters the reaction vessel and destroys a glovebox window or glove, causing liquid to be blown out into the room. Two HEPA filters at 99.9% and 99.8% reduce the atmospheric release to $4.5 \times 10^{-6}$ grams plutonium. The calculated dose at the facility boundary is $7.1 \times 10^{-5}$ rem.

These two scenarios are similar in that the calculated dose outside the building for both postulated events is well below the criteria for an Alert emergency. However, a glovebox explosion could injure and contaminate workers inside the facility. Emergency classification would depend upon the number of people injured and contaminated and the extent of outside assistance required to control the event.

In general, the Alert classification is appropriate when the severity and/or complexity of an event may exceed the capabilities of the normal operating organization to adequately manage the event and its consequences.

**C.5.1.4.2 Building Breach Explosion.** The 325 Building contains a number of potential explosives including gas cylinders and volatile flammable solvents. An explosion equivalent to 1.8 kilograms of TNT is postulated to occur from the accumulation of flammable gas or vapor from a leak. The explosion buckles the metal siding in the exterior building wall and blows 14% of the plutonium oxide located near the wall through the hole. The source term is derived starting with 230 g of Pu, 10% of which is in the respirable size range. Fifteen per cent is airborne from the explosion. The material is assumed to be plutonium for FFTF fuel. The activity release from the building is summarized in Table C.14 below.

The calculated dose is 11 rem at the facility boundary and 1.1 rem at the site boundary. These results place this scenario in the General Emergency category.

**Table C.14.** Source Term for Building Breach Explosion

| Nuclide | Ci |
|---|---|
| $^{238}Pu$ | 0.004161 |
| $^{239}Pu$ | 0.026298 |
| $^{240}Pu$ | 0.013323 |
| $^{241}Pu$ | 0.664806 |
| $^{241}Am$ | 0.002183 |
| $^{242}Pu$ | 3.48E-06 |

### C.5.1.5 Loss of Containment/Confinement

Containment is defined in PNL-7748 as a region designed to meet code requirements for containment and that is leak tested. Examples include liquid waste tanks and shipping casks. The PNL-7748 loss-of-containment accident that involves radiological material is a spill from a liquid waste cask. Chemical loss of containment accidents are described in the Hazardous Material Release section of this document.

Confinement is an area in which the spread of contamination is reduced or eliminated by the use of engineered barriers and controlled airflow to minimize leakage. The gloveboxes, hot cells, and fume hoods are examples of confinement regions. The PNL-7748 loss of confinement events included a loss of ventilation caused by a complete power failure and a breach of a primary filter. The loss of containment and loss of confinement scenarios are described below.

**C.5.1.5.1 Liquid Waste Cask Accident.** Liquid wastes can be transferred to the cask-handling station east of the 325A hot cells from the hot cells, gloveboxes, or any of the vault tanks. The casks are moved into and out of the station by an overhead bridge crane. This scenario postulates the spill of 550 gallons of liquid waste during cask loading. Actual spills would likely be smaller since there are many administrative and engineering barriers to the release of contaminated liquid. For example, the transfers are accomplished by vacuum so there is little or no driving force to cause a spill if a line were to break or become disconnected.

The source term is derived assuming a bowling-ball cask that contains 550 gallons of liquid waste spills. Wastes with many different isotopic compositions have passed through the cask handling station. Two types of wastes were considered in PNL-7748. The one that gave the highest consequences was waste from the NWVP program. The isotopic concentration for this waste stream was:

- Pu-238 0.00029 Ci/L with a total inventory in the spill of 0.6037 Ci
- Pu-239 3.2E-05 Ci/L with a total inventory in the spill of 0.0666 Ci
- Pu-240 4.8E-05 Ci/L with a total inventory in the spill of 0.0999 Ci
- Pu-241 0.0097 Ci/L with a total inventory in the spill of 20.19 Ci
- Pu-242 1.4E-07 Ci/L with a total inventory in the spill of 2.91E-04 Ci

The maximum spill height is about 8 feet, the approximate height of the top of a cask when in the station. The airborne release fraction from the falling liquid is 2.4E-05. Additional material is resuspended over the next two hours. The total release fraction including the spill and resuspension for the first two hours is 1.5E-04. The airborne material must pass through two stages of HEPA filtration with a total reduction factor of 2E-06. Table C.15 below summarizes the activity released from the building in the first two hours following the spill.

The calculated dose at the facility boundary is $6.2 \times 10^{-8}$ rem which is well below the Alert dose criteria. The calculation takes credit for both the primary and exhaust HEPA filters and therefore does not apply to a cask spill outside the facility. The dose would be a factor of 2E+06 higher outside the building or 120 mrem. A spill outside the building would be an Alert level emergency.

**Table C.15.** Source Term for Liquid Waste Cask Spill

| Nuclide | Ci |
|---|---|
| $^{238}$Pu | 1.77E-10 |
| $^{239}$Pu | 1.95E-11 |
| $^{240}$Pu | 2.93E-11 |
| $^{241}$Pu | 5.91E-09 |
| $^{242}$Pu | 8.53E-14 |

**C.5.1.5.2 Complete Loss of Electrical Power.** Confinement of material within the 325 Building hot cells and gloveboxes depends, in part, upon maintaining a negative pressure in the cell/box relative to the gallery or laboratory. The negative cell pressure causes air flow into the cell through openings in the cell wall. Air is exhausted out of the cell through a ventilation system that includes three stages of HEPA filters. Loss of ventilation can result in reverse air currents out the inlet openings and into the gallery. From there, hazardous material can be released from the building through gaps under closed doors and other similar openings. The building is not designed to be a leak tight containment structure.

The bounding loss-of-confinement accident results from a loss of building ventilation caused by a complete loss of electrical power. The event is postulated to occur during the process of dissolving spent nuclear fuel in a hot cell. Furthermore, the ventilation loss is postulated to result in solvent vapor concentration in a glovebox containing plutonium. The vapor explodes releasing more material. The source term for this release is shown in Table C.16. Details of the source calculation may be found in Appendix B, Section B.7 of PNL-7748.

The calculated dose at the facility boundary is 4.0 rem. The site boundary dose is 0.42 rem. These results place this postulated release in the Site Area emergency category.

The hot cell source term for this scenario was derived from a program that is not currently active in the 325 Building, the NWVP. This source was selected since it includes a large inventory of gaseous fission products which could be released if ventilation is lost. Liquid or solid material would normally not be released immediately following a ventilation loss unless some other condition such as air currents from a fire existed to move significant quantities of the material out of the cell. Loss of hot cell and/or glovebox ventilation would range from a non-emergency to a Site Area

**Table C.16.** Source Term for Loss of Electrical Power

| Nuclide | Ci |
|---|---|
| $^{3}H$ | 0.017 |
| $^{85}Kr$ | 2.65 |
| $^{238}Pu$ | 2.05E-03 |
| $^{239}Pu$ | 1.30E-02 |
| $^{240}Pu$ | 6.56E-03 |
| $^{241}Pu$ | 0.326 |
| $^{242}Pu$ | 1.71E-06 |
| $^{241}Am$ | 1.07E-03 |

Emergency condition depending upon the form and size of the inventory in the confinement structure and the existence of a condition that could move the material. The gallery/room CAMs could provide a key indication of a release from confinement.

### C.5.1.6 Hazardous Material Release

Two hazardous material release scenarios are summarized below. The first is a spill of a bottled chemical in one of the chemistry laboratories. The second scenario is the spill of 80 liters of 4 molar nitric acid from a tank in another laboratory.

**C.5.1.6.1 Bottled Chemical Spill.** Spills occasionally occur in chemistry laboratories. PNL-7748 selected Thionyl chloride as the bounding case for the spill of a single bottle of a potentially harmful chemical. This toxic chemical has been used in the building but was not present on the January 1994 chemical inventory list. The scenario postulates that a 1 kilogram bottle of thionyl chloride is dropped and broken against the edge of a hood. The resulting puddle evaporates completely. The calculated source term is 0.735507 grams/second or the complete evaporation of the 1 kilogram in 22.7 minutes. It is assumed that condensation and filtration do not act to reduce the vapor concentration before it leaves the building. The calculated airborne concentration at the facility boundary was 0.88 miligrams/meters$^3$ and 0.1 miligram/meter$^3$ at the site boundary. The only concentration limit parameters that have been established for this chemical is a American Conference of Governmental Industrial Hygienists (ACGIH) ceiling value of 5 mg/m$^3$ (1 ppm) and an Immediately Dangerous to Life and Health (IDLH) value of 500 ppm. The ceiling value is an alternative parameter for ERPG 2, and the IDLH value is an alternative for ERPG 3. Therefore, this spill is not a Site Area emergency since the concentration is below the ERPG 2 value at the facility boundary. Pending the development of a ERPG 1 equivalent concentration, this event would be conservatively classified as an Alert Emergency if the pungent odor caused building evacuation.

**C.5.1.6.2 Nitric Acid Tank Spill.** The second loss-of-containment chemical accident is a spill from a ruptured acid tank. The accident involves a fire or explosion in Laboratory 510. The event breaks lines or glass pipe tanks in the hood and releases 80 liters of 4 molar (22 weight/percent) nitric acid. The hood airflow is assumed to continue throughout the event; this, together with the increased temperature resulting from the initiating fire or explosion, accelerates the evaporation of nitric acid from the puddle. The source term is 0.56 grams/ second with the entire spill evaporating in 9.8 hours. It is further assumed that condensation and filtration do not act to reduce the vapor concentration before it leaves the building. The calculated concentration is 0.26 ppm at the facility boundary. This concentration is less than the criteria for an Alert Emergency, 2 ppm for nitric acid. Therefore, this accident would not be an emergency condition unless extensive outside assistance was required to mitigate and control the event.

**C.5.1.6.3 Conclusion for Chemical Accidents in the 325 Building.** The 325 Building has relatively small inventories of over a thousand chemicals. The screening process described in Section C.3 above did not identify any chemicals that would be expected to be a problem outside the facility if spilled inside the building. There is always the possibility that inadvertent mixing of chemicals would result in a product that is more toxic than any of the ingredients. However, the number of possible combinations is so large that it is difficult to bound this potential problem. The suggested approach is to have an Alert EAL tied to an adverse condition that requires facility evacuation. Some examples of conditions that could prompt an evacuation are a pungent suffocating odor in the hall or widespread reports of people with irritated eyes.

#### C.5.1.7 Criticality

The fissionable materials that are received, handled, stored, and analyzed in the 325 Building can be of any type and form with varying isotopic content. The majority of the operations in the facility involve analysis of small samples of materials. The safeguards limit is currently less than 2000-g plutonium (or its equivalent) for the whole building, with an additional less than 2000-grams plutonium limit for the CEPOD process. By the nature of operations, the inventory is generally spread throughout the building with only small amounts in any given glovebox or fume hood.

The limiting criticality scenario is a glovebox criticality involving two kilograms of Pu in solution. The energy release is taken from NRC Regulatory Guide 3.35. There is an initial pulse of $1.0 \times 10^{18}$ fissions followed by 47 bursts of $1.9 \times 10^{17}$ fissions each at ten-minute intervals. The noble gas and halogen radionuclides that are released escape unhindered out the stack over an 8-hour period. Salt particles are also formed during evaporation of the solution. The salt particles release out the stack is mitigated by two HEPA filters. The source term for the first two hours of this event is shown in Table C.17. Section B.9 in PNL-7748 provides the details of the calculation.

Experience has shown that the radiation dose from an unshielded criticality would likely be fatal to anyone within 25 feet of the event. The facility boundary (100 meters) individual is assumed to remain within 100 meters of the building for 2 hours after the first burst. The calculated dose from inhalation and submersion is 9.3 rem to the facility boundary individual. The calculated inhalation and submersion site boundary dose is 1.6 rem. In addition, the direct radiation dose is calculated to be 14.1 rem at 100 meters if someone remains stationary at this distance for two hours. These doses place this event in the General Emergency category.

The Hanford policy is to classify a near criticality as an Alert Emergency and an actual criticality as at least a Site Area Emergency (unless the calculated consequences put the actual criticality in the General Emergency category). A near criticality is an event where the safety margin is known to be lost and the potential for a criticality is high. The Alert classification for this situation is based upon the general criteria that an Alert Emergency Level should be declared when events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety. A near or actual criticality will require worker evacuation and access restrictions. Resources outside the facility will be

**Table C.17.** Source Term for Glovebox Criticality

| Nuclide | Ci |
|---|---|
| $^{83m}Kr$ | 3.4E+01 |
| $^{85m}Kr$ | 2.2E+01 |
| $^{85}Kr$ | 2.5E-04 |
| $^{87}Kr$ | 1.3E+02 |
| $^{88}Kr$ | 7.1E+01 |
| $^{89}Kr$ | 4.0E+03 |
| $^{131m}Xe$ | 3.1E-02 |
| $^{133m}Xe$ | 6.8E-01 |
| $^{133}Xe$ | 8.4E+00 |
| $^{135m}Xe$ | 1.0E+03 |
| $^{135}Xe$ | 1.3E+02 |
| $^{137}Xe$ | 1.5E+04 |
| $^{138}Xe$ | 3.4E+03 |
| $^{131}I$ | 3.4E+00 |
| $^{132}I$ | 3.7E+02 |
| $^{133}I$ | 5.0E+01 |
| $^{134}I$ | 1.3E+03 |
| $^{135}I$ | 1.4E+02 |
| $^{238}Pu$ | 3.7E-09 |
| $^{239}Pu$ | 3.7E-08 |
| $^{240}Pu$ | 7.8E-09 |
| $^{241}Pu$ | 2.0E-07 |
| $^{242}Pu$ | 1.0E-12 |
| $^{241}Am$ | 6.3E-10 |

required to control access, evaluate the situation, and recover to a safe subcritical configuration. For these reasons, activation of the emergency response organization is required whenever an unshielded, uncontrolled criticality is judged to be likely.

## C.5.2 Natural Emergencies

Seismic events, high winds/tornados, floods, ash/snow roof loading and range fires are natural phenomena with potential emergency consequences. As described in Section C.2.2.1, the 325 Building is above the PMF flood plane and the likelihood of flooding is considered to be quite low. The emergency planning for major failures of upstream dams is beyond the scope of this Hazards Assessment. The roof design is adequate to withstand ash and snow loading. A range fire that ignites the building would have the same consequences as the uncontrolled building-wide fire discussed in Section C.5.1.3.4 above. The paragraphs below summarize the PNL-7748 analysis of the seismic and high winds events. The classification that has been adopted at Hanford for a range fire is also discussed.

### C.5.2.1 Earthquake

The site-specific seismic criteria for existing High Hazard facilities in the 300 Area is a horizontal ground acceleration of 0.1 g with appropriate response spectrum, damping values, and soil-structure interaction parameters. The probability of an event of this size is 4 x $10^{-4}$ per year (return period of 2500 years). However, the ongoing seismic evaluation has investigated the central portion and east and west wings of the building structure and the cell structures as new, nonreactor nuclear facilities, which must meet a 0.135g horizontal acceleration with a 5000-year return period. The hot cells and many of the external walls are expected to retain their integrity during the event. However, the ventilation system and some building windows could fail. Doors could be jammed open by door frame displacements. The driving force for material to leave the building is wind coming through openings in the building. Table C.18 shows the activity released in the first 2 hours from the earthquake scenario. Section B.1 in PNL-7748 shows how the source was determined.

**Table C.18.** Source Term for Earthquake Without Fire

| Nuclide | Ci | |
|---|---|---|
| $^{3}H$ | 0.0425 | |
| $^{85}Kr$ | 66.2 | |
| **Nuclide** | **Nitrate Ci** | **Oxide Ci** |
| $^{232}Th$ | 2.23E-10 | 2.32E-06 |
| $^{238}U$ | 1.04E-08 | 4.17E-05 |
| $^{235}U$ | 5.34E-10 | 1.16E-06 |
| $^{233}U$ | 1.36E-06 | 4.68E-07 |
| $^{237}Np$ | 6.88E-07 | 2.36E-07 |
| $^{238}Pu$ | 0.002016 | 0.000772 |
| $^{239}Pu$ | 0.002047 | 0.001203 |
| $^{240}Pu$ | 0.001037 | 0.000609 |
| $^{241}Pu$ | 0.051751 | 0.030407 |
| $^{241}Am$ | 0.000877 | 0.000343 |
| $^{242}Pu$ | 2.88E-07 | 1.65E-07 |
| $^{243}Am$ | 2.09E-05 | 7.17E-06 |
| $^{244}Cm$ | 0.00313 | 0.001075 |

The calculated facility boundary dose is 2.3 rem and the offsite dose is 0.24 rem. These values put this event in the Site Area Emergency category. The calculated consequences of an earthquake followed by a fire are 94 rem at the facility boundary and 9.7 rem at the site boundary. The earthquake followed by a fire would be a General Emergency.

A major seismic event can be preceded by tremors and followed by after-shocks. The after-shocks can cause additional damage to already weakened structures. Because of these possibilities, the Hanford policy is to declare an Alert Emergency if a seismic event is felt at a High Hazard facility and some damage such as broken windows is observed. A Site Area Emergency is declared if the damage is more severe but a significant release has not occurred. Major structural or service system damage at the 325 Building is classified as a General Emergency based on the calculated consequences reported in PNL-7748 for a seismic event followed by a fire.

#### C.5.2.2 High Winds/Tornado

The 325 Building was designed and built to survive an 86 mph wind with a safety factor of 2.5 based on the ultimate strength of the structural members. The building has experienced two wind storms in recent years with gust to 80 mph (1972) and 73 mph (1990) with no damage. The estimated peak credible (E-6 probability) wind is 120 mph with gust to 130 mph. The 300 area design basis wind (E-4 probability) is 90 mph. Preliminary analyses of the effect of this wind indicate that the building can withstand both windblown missiles and the pressures imposed on the upwind side. However, the suction caused by the wind could cause a failure of the members supporting the roof of the south part of the 325A annex (the part containing hot cells). The hot cells because of their structure are not expected to suffer significant damage from the failure of the roof above them. The consequences of a tornado striking the 325 Building were not analyzed in PNL-7748 since the analysis is not required by the current Hanford Site design criteria.

A graded precautionary approach is recommended for high winds at the 325 Building. An Alert Emergency should be declared if sustained 300 area winds exceed 90 mph or 325 Building damage from high winds is observed. PNL-7748 concludes that some building damage is expected for a 90 mph wind speed. The Alert classification is based on a potential or actual degradation of the level of safety at the facility.

A General Emergency should be declared if substantial 325 Building damage and/or disruption of service systems occurs due to high winds, tornado or other phenomena. The analysis of a seismic event shows that a significant offsite radiation dose can occur if building integrity is not maintained.

#### C.5.2.3 Range Fire

The Hanford Site is in a semiarid region with sagebrush and grasses growing between areas. Range fires periodically occur and can sweep over large regions before they are controlled. The summer months are historically the most likely time for a large fire to occur because of the combustible condition of the cheatgrass and bunchgrasses.

The 325 Building would probably not be the first building in the 300 Area affected by a range fire since it is surrounded by other buildings, roads and parking lots. A range fire that threatens the 300 Area is an Alert Emergency based on the potential degradation of safety at facilities that contain hazardous material. An actual fire at the 325 Building would be classified per the discussion in Section C.5.1.3 above.

### C.5.3 Security Contingencies

DOE Order 5500.3A specifies that the facility hazards assessment shall consider the broad range of emergency events that could affect the facility. These events may result from hostile attack, terrorism, sabotage, or malevolent acts as well as the more traditional accidents and natural phenomena covered in a SAR. Closely related DOE Order 5630.3 requires a graded assessment of radiological and toxicological sabotage vulnerability. Events of this type are not within the scope of a SAR. A document called a Vulnerability Analysis (VA) has been written for some Hanford facilities to characterize the risk from these events and the effectiveness of security measures to detect and prevent the events. The VA is usually classified since it discusses security systems and could be useful to someone that wishes to damage the facility. The paragraphs below are not from a 325 Building VA. Instead, they reflect the general Hanford emergency preparedness policy toward events of this type and the potential for onsite and offsite significant consequences.

#### C.5.3.1 Explosive Device

A presence of an explosive device in a High Hazard facility such as the 325 Building is classified as an Alert emergency. Activation of the emergency response organization will assist in building evacuation and access control. Furthermore, activation of the emergency response organization when the device is found will speed the response if the device detonates. A confirmed detonation of an explosive device near any of the locations that contain hazardous material is classified as a General Emergency. The analysis of a building breach explosion shows offsite dose values over a rem for an explosion in the 325 Building.

#### C.5.3.2 Sabotage

Confirmed physical damage from sabotage to any safety system within the 325 Building is classified as an Alert Emergency since the level of safety has been degraded and there could be additional damage that has not yet been discovered. Any release that occurs due to sabotage is classified based on the known or potential severity of the release.

#### C.5.3.3 Hostage Situation/Armed Intruder

A confirmed hostage situation or armed intruder within the 300 Area is classified as an Alert emergency since the perpetrator(s) could attempt to damage a facility. Furthermore, the resources of the emergency response organization will be useful in controlling access to the area and identifying and assessing potential damage scenarios. The emergency classification should be upgraded to a Site Area Emergency if the armed intruder(s) are located in areas that have control over large inventories of hazardous materials. For example, the 325 Building hot cell operating galleries or laboratories that contain plutonium. Any release that occurs from the action of intruders should be classified based on the known or potential severity of the release.

#### C.5.3.4 Aircraft Crash

PNL-7748 concluded that the probability of an accidental aircraft crash hitting the 325 Building is less than 1.0E-6 per year. As a result, the consequences of the crash were not analyzed. This low probability is based on an evaluation that considers the area of the building, distance from the local airports and number of flights per day at the local airports. The Hanford Site contains many facilities with a much larger total area. Whereas the probability of hitting a specific facility may be in the incredible category, the probability of hitting some Hanford facility is not incredible. Furthermore, malevolent events were not included in PNL-7748. For these reasons, the classification of an aircraft crash should be included in emergency procedures.

The range of possible releases from an aircraft crash or missile is quite large. A small aircraft crash near the facility may not release any material whereas a direct hit from a commercial jet liner could cause extensive damage to the facility and a large release. The suggested approach is to classify any aircraft crash near or at the facility as an Alert emergency. If extensive damage or a large fire is caused by the crash, the emergency would be classified based on the loss of confinement or fire EALs.

#### C.5.3.5 Stack Release

Most of the air from the 325 Building exits the building through a 16.8-meters (55-feet) tall exhaust stack. The stack has record samplers for alpha particulate, beta/gamma particulate, $^{131}I$ and tritium and monitors for alpha particulate, beta/gamma particulate and $^{131}I$. The system will alarm in several locations on high activity.

The paragraphs below compare the release size to reach an Alert Level emergency with the release size that will trigger an alarm.

The criteria for an Alert emergency is a committed dose equivalent of 100 mrem at the facility boundary. The facility boundary for purposes of the calculation is 100 m east. The calculation is based on $^{90}Sr$ for beta/gamma activity and $^{239}Pu$ for alpha activity. These isotopes give the highest dose per curie released for alpha and beta emitting isotopes in the 325 Building inventory. In both cases, the majority of the dose is from inhalation.

The dose from inhalation is calculated using the following equation:

$$H = B \times Q \left( \frac{E}{Q} \right) \times C \qquad \text{(C.1)}$$

where $H$ = committed inhalation dose (rem)
$B$ = breathing rate ($m^3/s$)
$E/Q$ = short term normalized time-integrated air concentration ($s/m^3$)
$C$ = dose conversion factor (rem/Ci)

The following data was used in the calculation:

- $B = 1.2\ m^3/hr = 3.33 \times 10^{-4}\ m^3/s$ (From ICRP 23 for light activity)
- $E/Q = 1.2 \times 10^{-3}\ s/m^3$ (From PNL-7748 Section B.2.2.7 at 100 m)
- $H = 0.1$ rem (Criteria for an Alert emergency)

**Inhalation Dose Conversion Factors**
**Adult 50 Year Dose Equivalents from ICRP Publication 56 (1989)**

| Isotope | mSv/Bq | Rem/Ci |
|---|---|---|
| $^{90}Sr$ | 6.0E-05 | 2.2E+05 |
| $^{239}Pu$ | 0.12 | 4.4E+08 |
| $^{131}I$ | 8.2E-05 | 3.0E+05 |

The following release amounts were calculated for an Alert emergency.

| Isotope | Release (Ci) |
|---|---|
| $^{90}Sr$ | 1.1 |
| $^{239}Pu$ | $5.7 \times 10^{-4}$ |
| $^{131}I$ | 0.83 |

These release amounts are based on an airborne concentration that gives an inhalation committed effective dose of 100 mrem at the maximum location. This is the criteria for the lowest level emergency classification. Much smaller releases would be an environmental contamination concern and may exceed discharge permit and reporting levels.

The stack monitor reads in counts per minute (cpm) for all isotopes. The monitor reading equivalent to the "Alert" release is calculated using a stack flow rate of 130,000 cfm, a sample flow rate of 1.5 cfm and a detector efficiency of 20% for beta particles, 10% for alpha particles and 6% for I-131 (Table C.19).

The monitor readings for an alert level release are off-scale high for the beta/gamma and alpha monitors and orders of magnitude higher than the normal background and alarm levels for all isotopes as shown in Table C.20.

**Table C.19.** Release Size for an Alert Level Emergency

| Isotope | Release (Ci) | Count Rate (Cpm) |
|---|---|---|
| $^{90}Sr$ | 1.1 | 5.6E+06 |
| $^{239}Pu$ | 5.7E-04 | 1.5E+03 |
| $^{131}I$ | 0.83 | 1.3E+06 |

**Table C.20.** 325 Building Stack Monitor

| Isotope | Alert Reading | Alarm Set Point | Typical Background | Full Scale Reading |
|---|---|---|---|---|
| $^{90}Sr$ | 5,600,000 cpm | 40,000 cpm | 100 cpm | 100,000 cpm |
| $^{239}Pu$ | 1,500 cpm | 40 cpm | 6 cpm | 10,000 cpm |
| $^{131}I$ | 1,300,000 cpm | 10,000 cpm | 100 cpm | 100,000 cpm |

Immediate declaration of an emergency condition based solely on the stack alarm with no other indication of a problem is not required since the alarm levels are far below the emergency levels of concern. A preliminary investigation should be conducted first to determine if the alarm is valid. The first step in the investigation is to observe the indicator and chart recorder. A spike is most likely caused by an instrument problem and not a significant release. A steadily increasing count rate to above the alarm level with no indication of an instrument malfunction, however, indicates a probable release. It is suggested that an Alert emergency be declared if the alarm appears to be valid and the level continues to increase to near a full scale reading for the Beta/gamma and iodine monitors and 1,500 cpm for the alpha particulate monitor. It is suggested that the Alert Emergency Action Levels for beta/gamma particulate and iodine monitor readings be set near the top of the instrument scale (90,000 cpm) since the calculated values that correspond to an Alert are off-scale high with the present instrumentation.

## C.6 Event Consequences

### C.6.1 Calculation Models

Consequences of the events and conditions identified in Section C.5 were taken directly from SAR-7748. The GENII program (Napier 1988) was used for radiological dose calculations.

The GENII program was developed by the Battelle Pacific Northwest National Laboratory to provide a state-of-the-art, technically peer-reviewed, documented set of programs for calculating radiation doses from radionuclides released to the environment. The program includes the capability to calculate radiation doses for acute releases, with options for annual dose, committed dose, and accumulated dose; for calculating the same types of doses from chronic releases; for evaluating exposure pathways including direct exposure via water (swimming, boating, and fishing), soil (surface and buried sources), air (semiinfinite cloud and finite cloud geometries), inhalation pathways, and ingestion pathways. The various options used for the analyses reported in this document are described below.

1. Radiological releases were estimated for periods of 2 hours during and after the event. This period was assumed to be the maximum duration of exposure onsite and at the fence line, based on conservative response times for the site emergency preparedness program.

2. The facility boundary dose is calculated at 100 meters due north, the location of the minimum 95th percentile dispersion (hence maximum concentration) for that distance. The 95th percentile site boundary doses are calculated 580 meters due east. The 95th percentile values were calculated with the 300 Area joint frequency file based on data from the years 1983 to 1987.

3. All releases were assumed to be ground level and building wake was included. A building area of 600-meters$^2$ was used in the wake calculation.

4. The types of doses considered were inhalation and immersion.

5. Plutonium and uranium oxide inventories were represented by lung clearance class Y. Lung clearance class W was used for plutonium and uranium in the scenarios where those radionuclides were in nitrate solution and were not exposed to heat severe enough to convert them to oxide.

### C.6.2 Comparison With the HUDU Program

The Hazards Assessment guidance document suggest using the same program that is used in the emergency centers. The Hanford Unified Dose Utility (HUDU) program is used in the centers to project the consequences of a release. HUDU uses the same dispersion algorithms as GENII but the two programs can give different dose values for the same source term. The differences stem from the greater flexibility of the GENII program. For example, lung clearance classes can be specified with GENII but not with HUDU. This can lead to a significant difference in the calculated dose value. For example, the difference between class Y and W is about 30% for $^{239}Pu$ but a factor of 16 for $^{238}U$. Also, GENII has an algorithm to determine the 95th percentile meteorology condition using a historical meteorology file. The wind speed and atmospheric stability class are input in HUDU since the code was designed to use the actual observed meteorology conditions at the time of the release. For a 300 Area ground level release without building wake, "F" class stability with a 0.89 m/s wind speed closely approximates the 95th percentile meteorology with GENII. For 300 Area ground level releases with a 600-m$^2$ building wake (the conditions that apply to the 325 Building), "F" class stability and a 4.7 m/s wind speed approximate the 95% meteorology condition in GENII. Once these differences in assumed meteorology conditions and dose conversion factors are resolved, the two codes give nearly the same answers for inhalation and submersion dose, Table C.21.

Table C.21. rem/Ci for a 325 Building $^{239}Pu$ Release

| Distance | GenII | Hudu |
|---|---|---|
| 100 m | 140 rem | 150 rem |
| 580 m | 15 rem | 15 rem |

## C.7 The Emergency Planning Zone

The Emergency Planning Zone (EPZ) is an area within which special planning and preparedness efforts are warranted since the consequences of a severe accident could result in Early Severe Health Effects (ESHE). DOE Order 5500.3A endorses the Emergency Planning Zone (EPZ) concept and requires that the choice of an EPZ for each facility be based on an objective analyses of the hazards associated with the facility. The Emergency Management Guide on Hazards Assessment provides several pages of guidance on establishing the size of the EPZ. The suggested approach is to determine the emergency classification of the events analyzed in the Hazards Assessment and then base the EPZ size on the larger of a default size for each emergency class or the maximum distance that an ESHE Threshold is exceeded. A final step is to make adjustments to the area, if necessary, based on reasonableness tests in the guidance document. For example, the selected EPZ should conform to natural and jurisdictional boundaries where reasonable. The selection of the EPZ for the 325 Building based on this Hazards Assessment is described below.

### C.7.1 The Minimum EPZ Radius

Three events have been identified that have the potential to cause a General Emergency; large fire, building breach explosion and criticality. In addition, a hot cell fire could reach a general emergency if the integrity of the HEPA filters is not maintained. The EPZ size is the larger of 5 km (the default size for a general emergency) or the maximum radius for ESHE. The Emergency Management Guide Hazards Assessment document provides the following criteria for ESHEs.

- **Radiological**

| | |
|---|---|
| External or uniformly distributed internal emitters | 100 rem |
| Thyroid | 3,000 rem |
| Skin | 1,200 rem |
| Ovary | 170 rem |
| Bone Marrow | 165 rem |
| Testes | 440 rem |
| Other Organs | 550 rem |

- **Non-Radiological**

A peak concentration of the substance in air that equals or exceeds the ERPG-3 value, or equivalent.

- **Conclusion**

All of the analyzed releases give consequences less than the ESHE criteria at the default distance of 5 km. Therefore, the EPZ for the 325 Building is a circle with a 5 km radius around the facility. One adjustment to this boundary is suggested in Section C.7.2.4 below to conform with the southern EPZ boundary for Washington Public Power Supply System (WPPSS) plant #2.

A 5 km EPZ was recommended for the entire 300 Area to the States of Oregon, Washington, and the adjacent counties. Oregon concurred with proposed EPZs, and Washington accepted them on a interim basis. Following approval by DOE Headquarters, Benton and Franklin counties will establish geo-political boundaries.

## C.7.2 Tests of Reasonableness

The following tests of reasonableness are from the guidance document on emergency preparedness hazards assessments.

1. Are the maximum distances to PAG/ERPG-level impacts for most of the analyzed accident scenarios equal to or less than the EPZ radius selected?

   All of the analyzed accident scenarios give consequences less than the PAG criteria at the default EPZ radius of 5 km.

2. Is the selected EPZ radius large enough to provide for extending response activities outside the EPZ if conditions warrant?

   The 5 km EPZ encompasses the entire 300 area, extends across the Columbia River into Franklin county and extends South into the Richland city limits.

3. Is the EPZ radius large enough to support an effective response at and near the scene of the emergency?

   The 5 km radius encompasses the entire 300 Area, the nearest other occupied Hanford facilities and the public roads leading to the facility.

4. Does the proposed EPZ conform to natural and jurisdictional boundaries where reasonable, and are other expectations and needs of the offsite agencies likely to be met by the selected EPZ.

   There are no natural boundaries near the 5 km EPZ with which it makes sense to align any of the EPZ boundary lines. The adjacent counties will set the geo-political boundaries when the 5 Km EPZ has been approved.

5. What enhancement of the facility and site preparedness stature would be achieved by increasing the selected EPZ radius.

   The Richland Operations Office and Hanford contractors have longstanding relationships and mutual aid agreements with local business, community, county and state emergency planning and response organizations. These relationships are driven by public concern about Hanford in general and the High Level Waste tanks in particular. The DOE and its contractors have a legal obligation and a strong moral commitment to protect the public and the Hanford workers. There is an open and candid dialogue about the hazards at the Hanford facilities as we currently understand them. No additional benefit in emergency preparedness stature is anticipated by increasing the size of the 325 Building EPZ.

## C.8 Emergency Classes, Protective Actions and EALs

### C.8.1 Emergency Classes

Table C.22 summarizes the emergency class for each scenario described in Section C.5.

### C.8.2 Emergency Action Levels

An ad hoc committee met in the winter of 1993 to write EAL statements based on the preliminary Hazards Assessment for the 325 Building (Marsh 1993). These statements are consistent with this updated Hazards Assessment with one exception. A hot cell fire with unfiltered release has the potential to reach a General Emergency instead of the Site Area emergency indicated in the reference. The preliminary Hazards Assessment used a filter reduction factor of 100 whereas a review of PNL-7748 indicates that a factor of 1000 was used to determine the source term for this event.

## C.9 HEARM Chapter

The Hanford Emergency Resource Manual (HEARM) provides information for use during an emergency. HEARM Provides summaries of the locations, operations, and potential accident scenarios for each facility. Several scenarios are selected to summarize the potential consequences of the event types that are applicable to the facility. The scenarios are selected to include the upper bound of worst-case conditions for each event type. The updated HEARM chapter based on this Hazards Assessment will be issued in a HEARM update.

**Table C.22.** Emergency Classification of Event Scenarios

| Event | Emergency Classification |
|---|---|
| **Fire** | |
| Hot Cell Fire(Filtered Release) | Non-emergency |
| Hot Cell Fire(unfiltered Release) | General |
| Consuming Glovebox Fire | Alert |
| Large Building Fire | General |
| **Process Explosions** | |
| Glovebox explosion | Non-emergency |
| Building Breach explosion | General |
| **Loss of Containment** | |
| Liquid Waste Cask Accident (Indoors) | Non-emergency |
| Liquid Waste Cask Spill (outdoors) | Alert |
| Complete Loss of Electrical Power | Site Area |
| Bottled Chemical Spill | Non-emergency |
| Nitric Acid Tank Spill | Non-emergency |
| **Criticality** | |
| Near Criticality | Alert |
| Actual Criticality | General |
| **Natural Disasters** | |
| Earthquake | General |
| High Winds | Alert |
| Extensive Wind/tornado damage | General |
| Range Fire that threatens 300 Area | Alert |
| **Security Events** | |
| Confirmed explosive device | Alert |
| Malevolent explosion | General |
| Sabotage to safety system | Alert |
| Hostage Situation/armed intruder | Alert |
| Aircraft Crash | Alert |
| **Stack Release** | |
| Confirmed beta/gamma near full scale | Alert |
| Confirmed iodine monitor near full scale | Alert |
| Confirmed Alpha monitor at 1,500 cpm | Alert |

## C.10 Maintenance and Review of this Hazard Assessment

The maintenance of this Hazards Assessment is the responsibility of Pacific Northwest National Laboratory. The building emergency plan including the EALs and Hazards Assessment are on an annual review cycle.

## C.11 References

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